# JOURNAL

*of the*

## INDIAN MEDICAL ASSOCIATION

VOLUME 33 NUMBER 6 CALCUTTA SEPTEMBER 16, 1959

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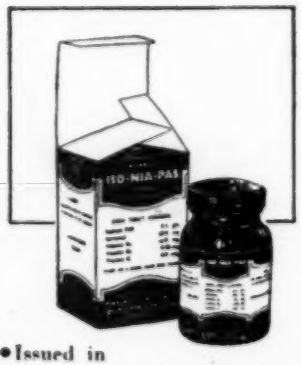


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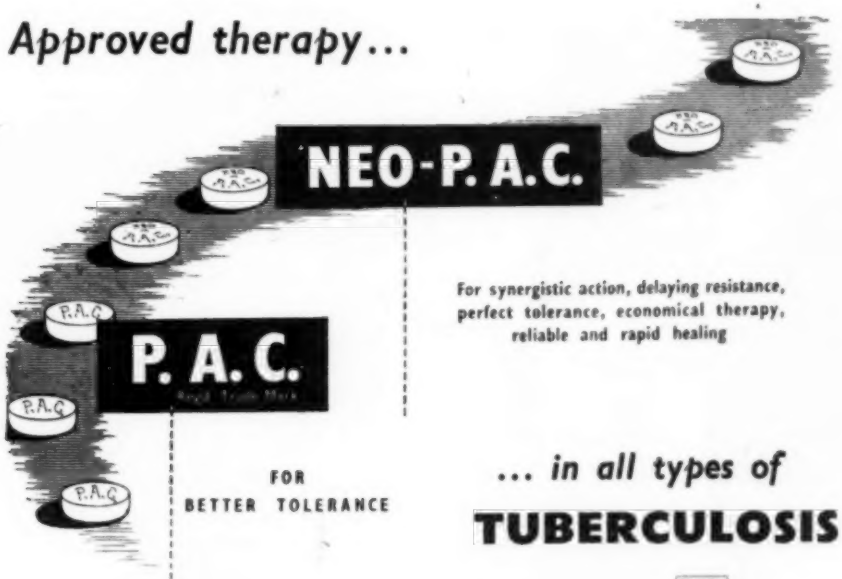


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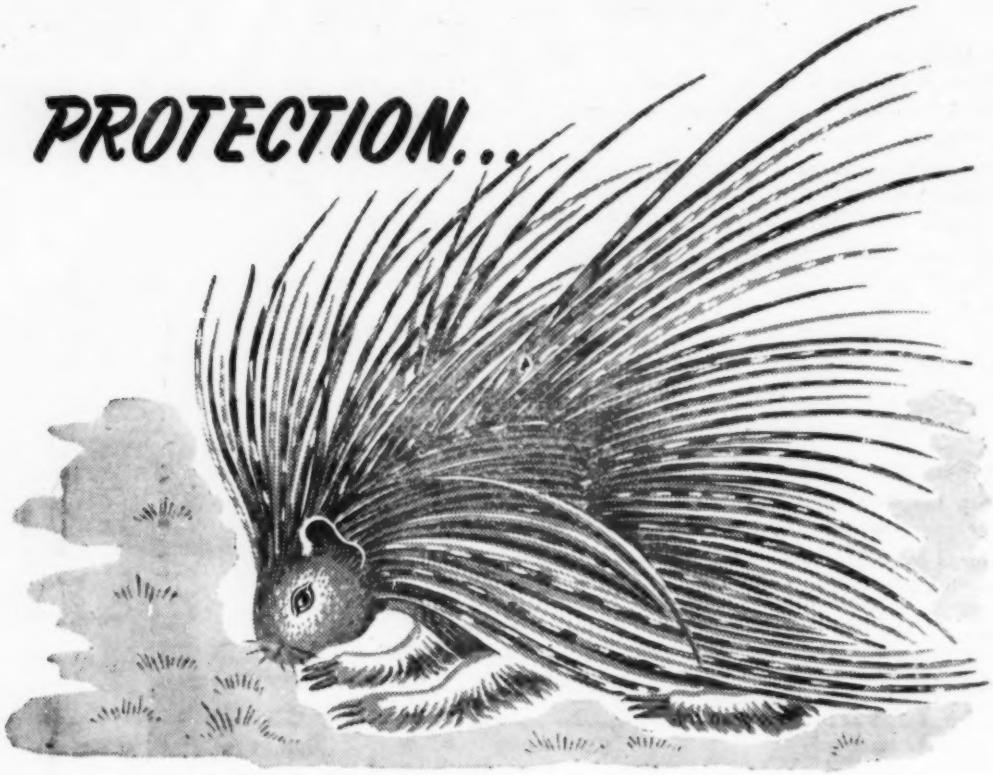

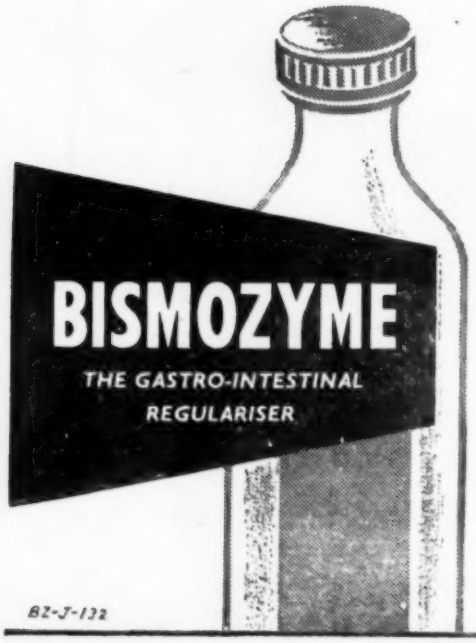


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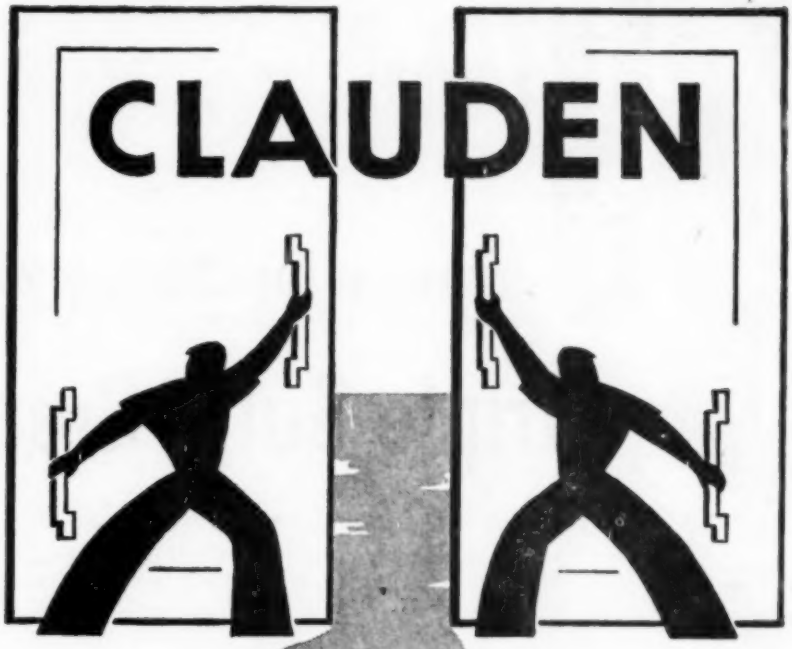

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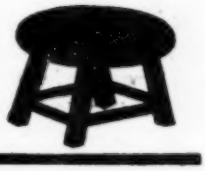

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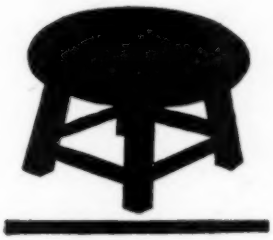

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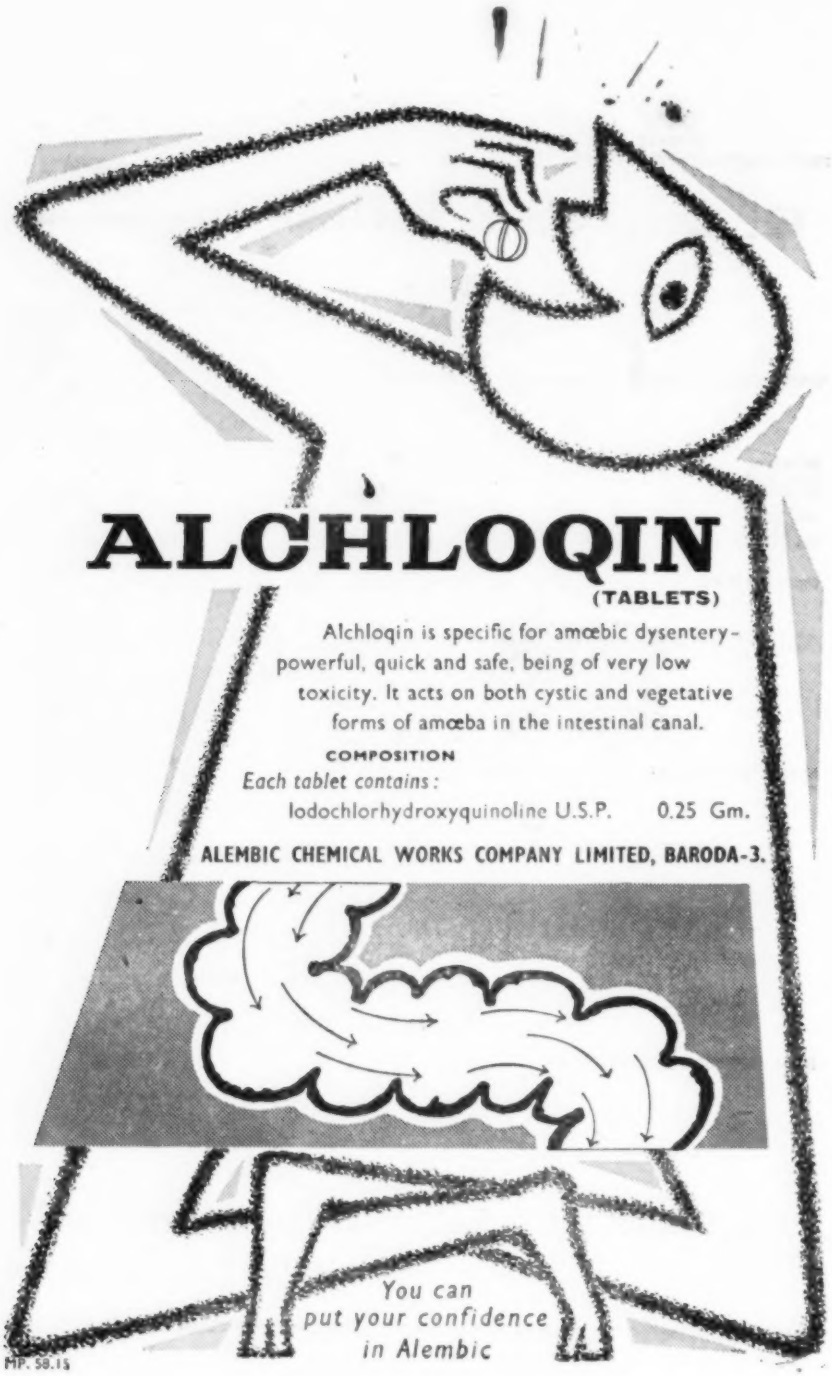

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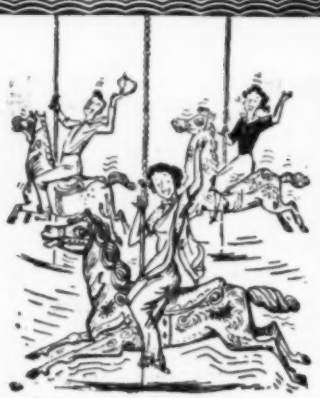

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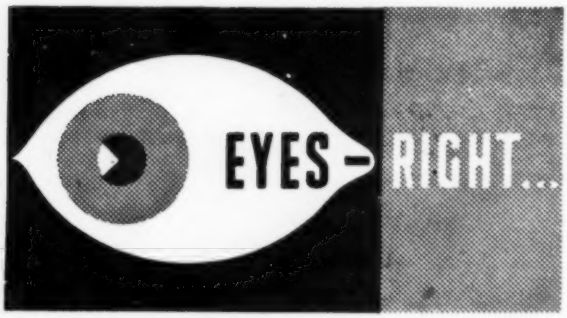


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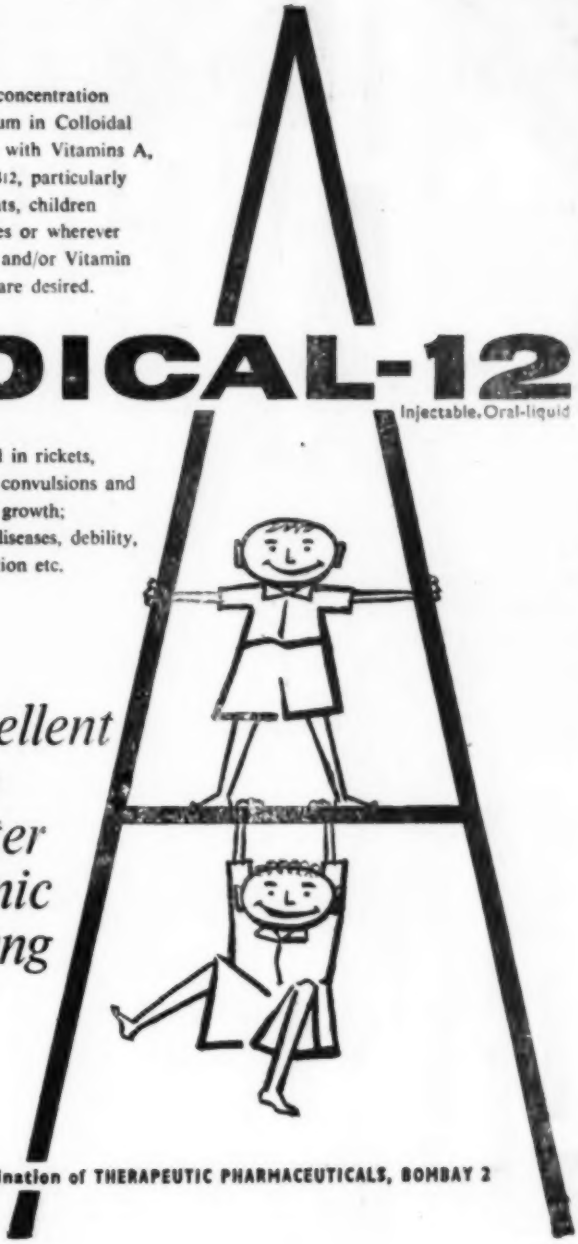

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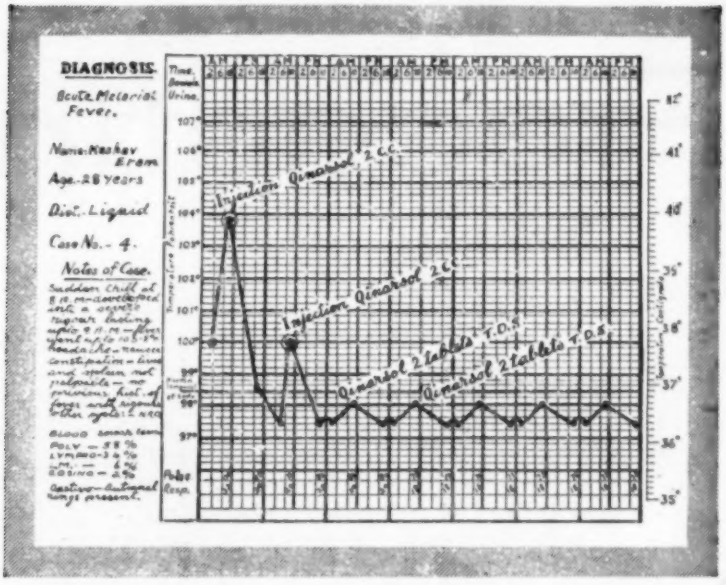


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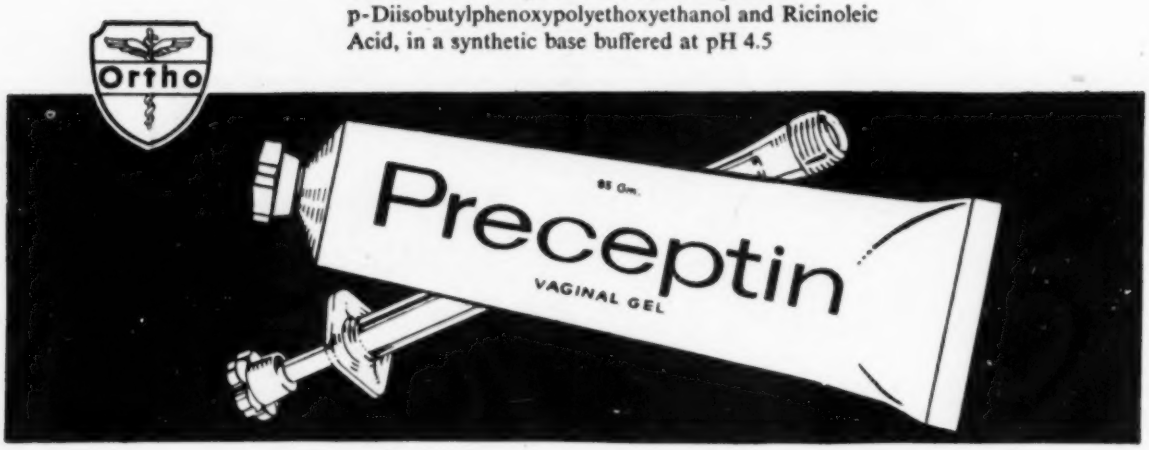


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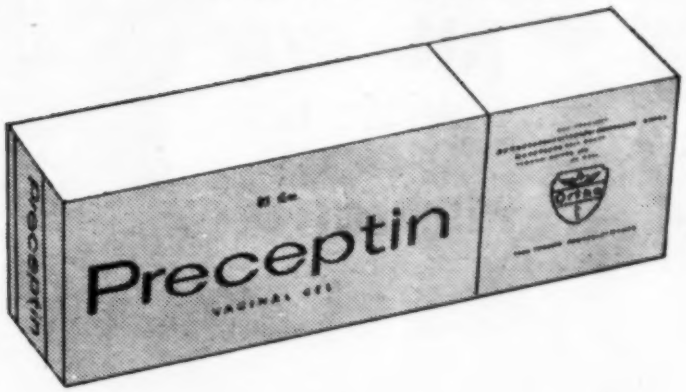


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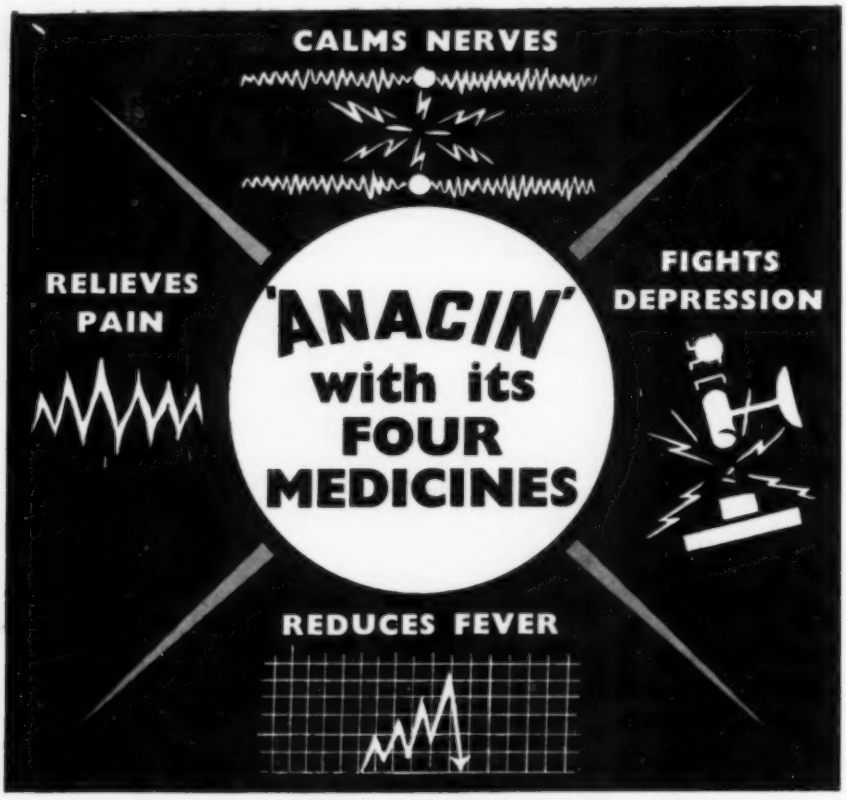


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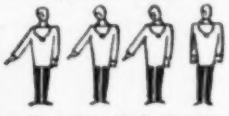

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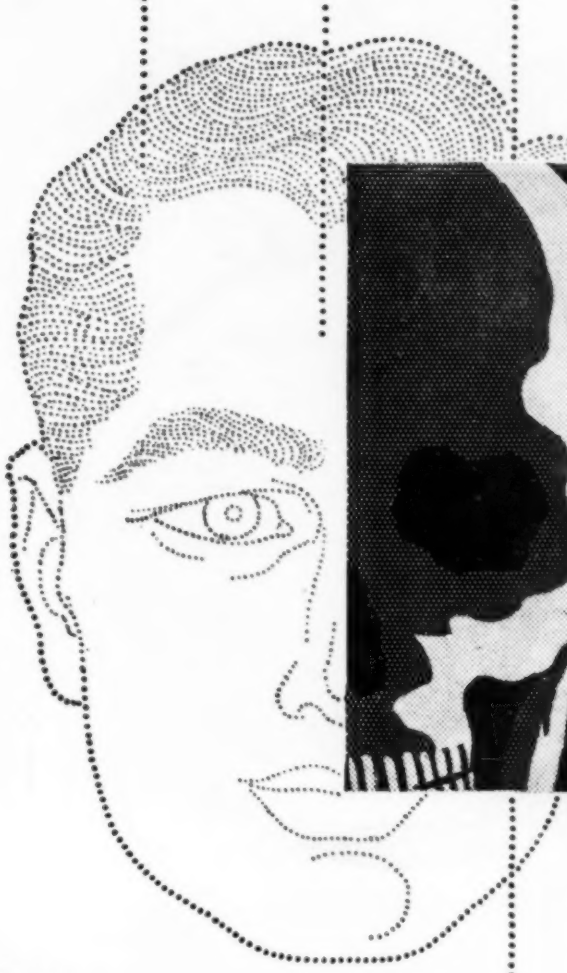

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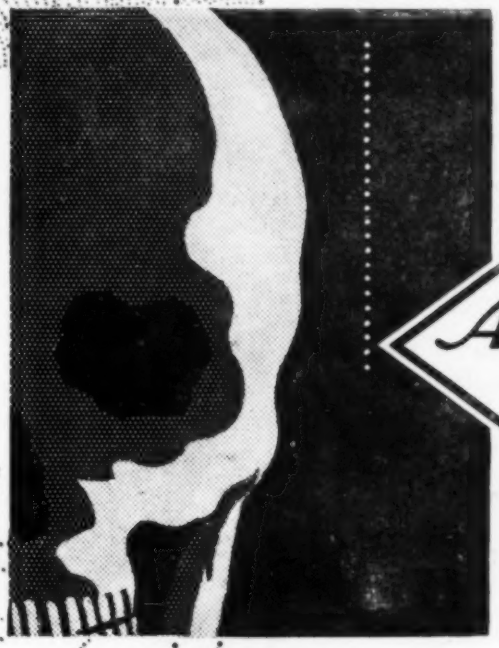

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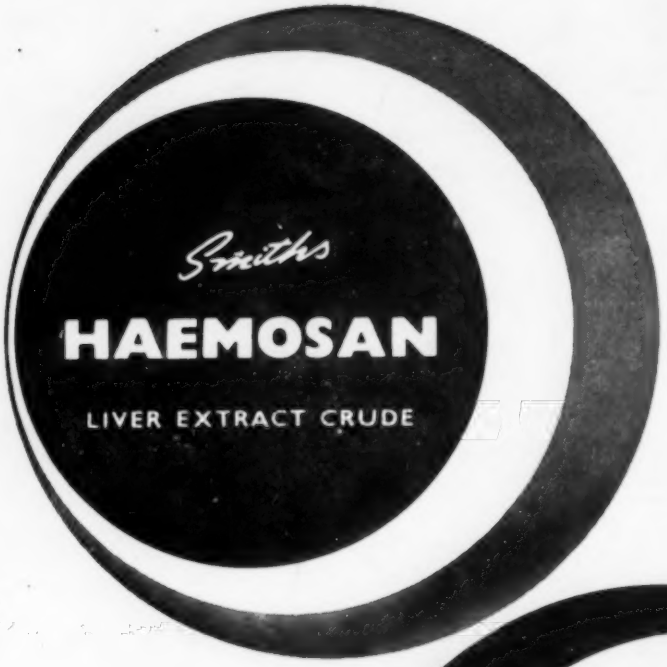


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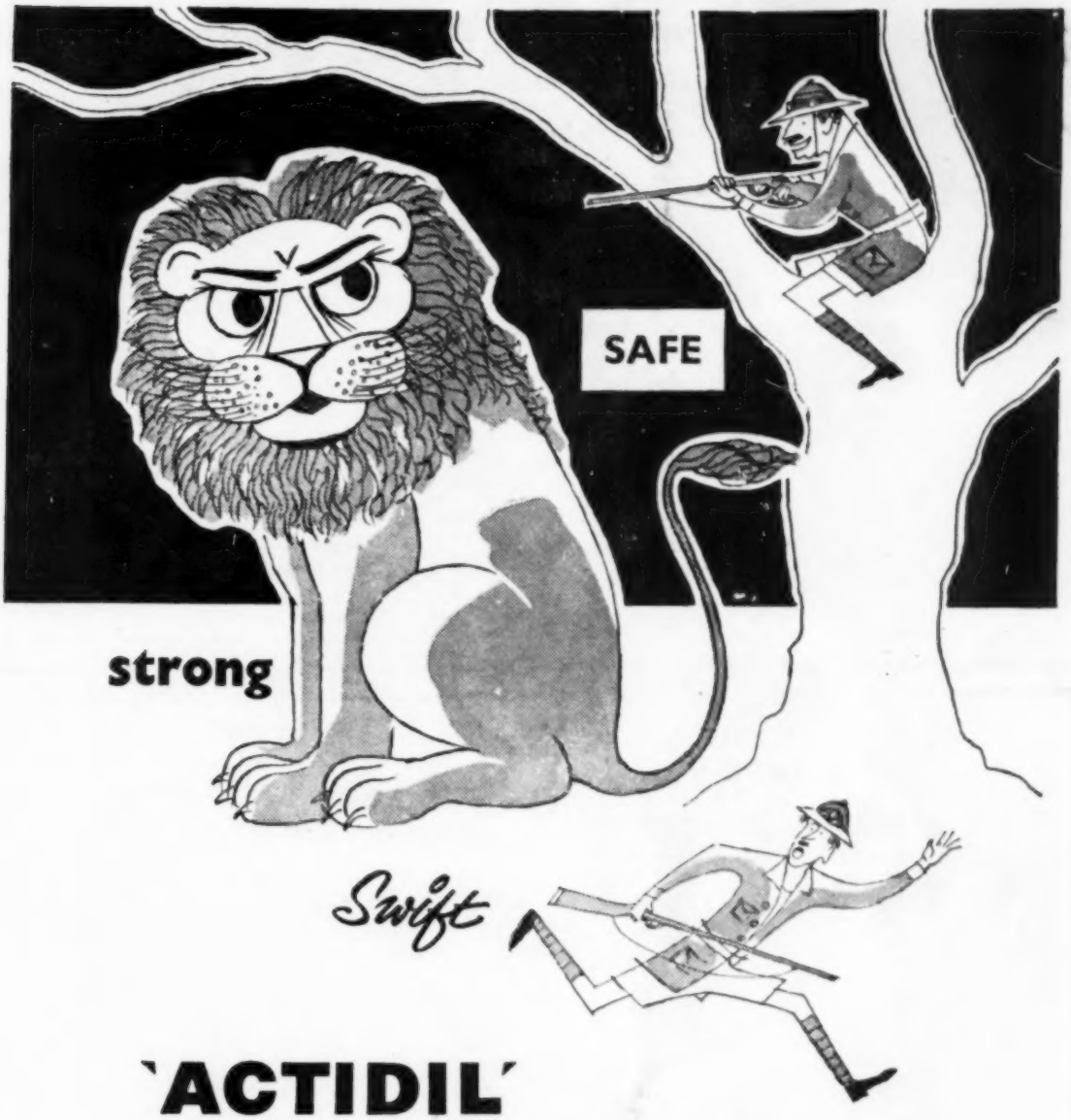


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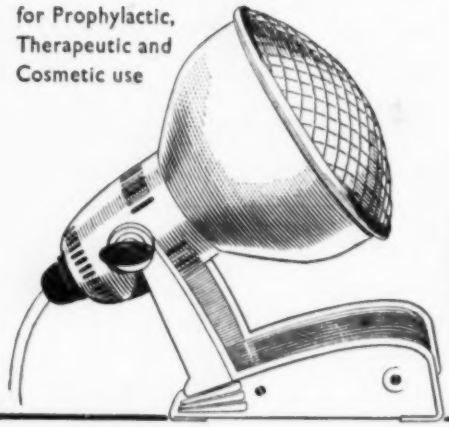

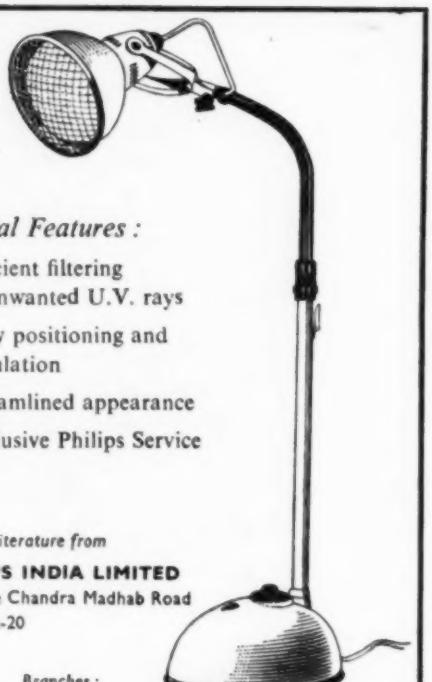

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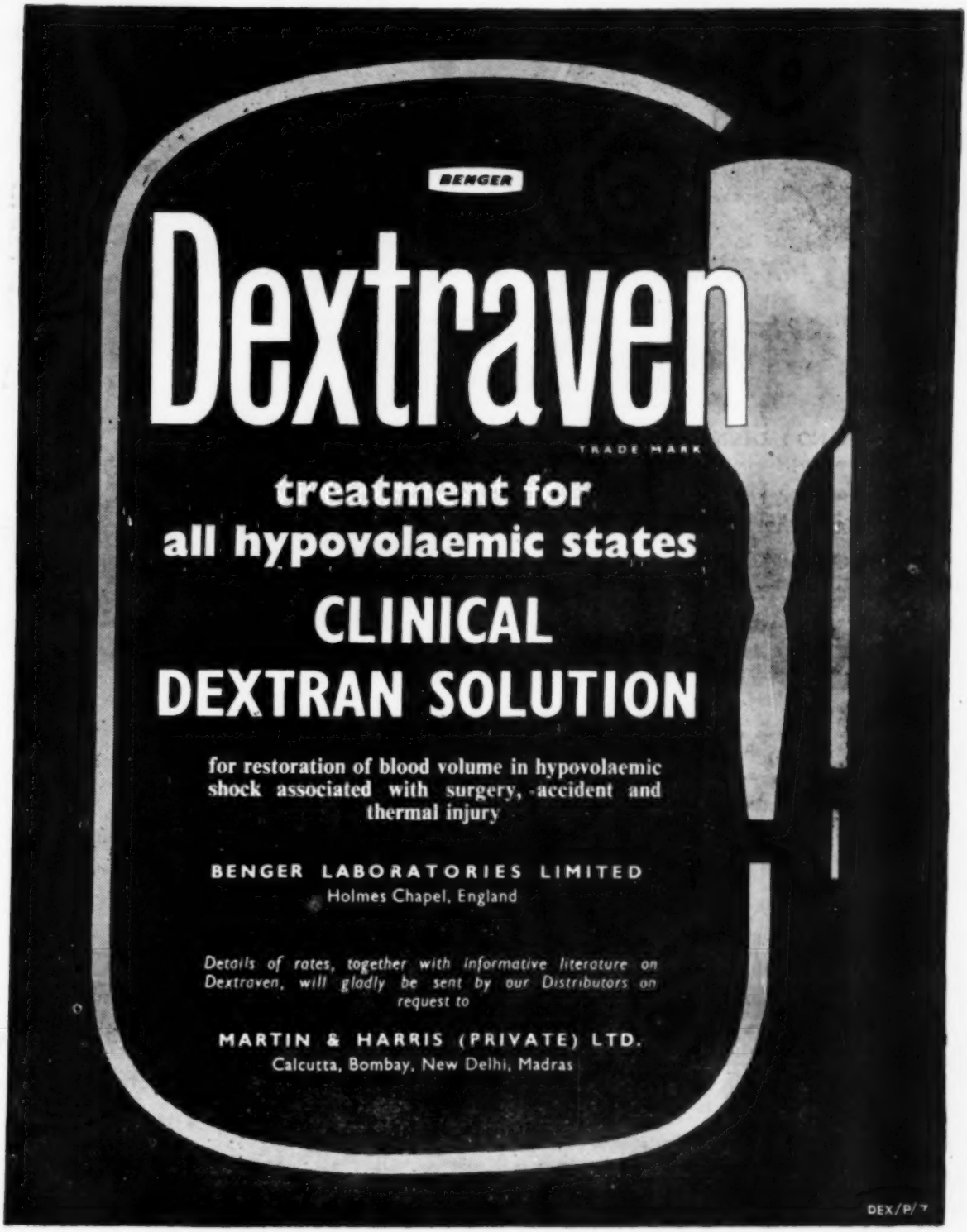
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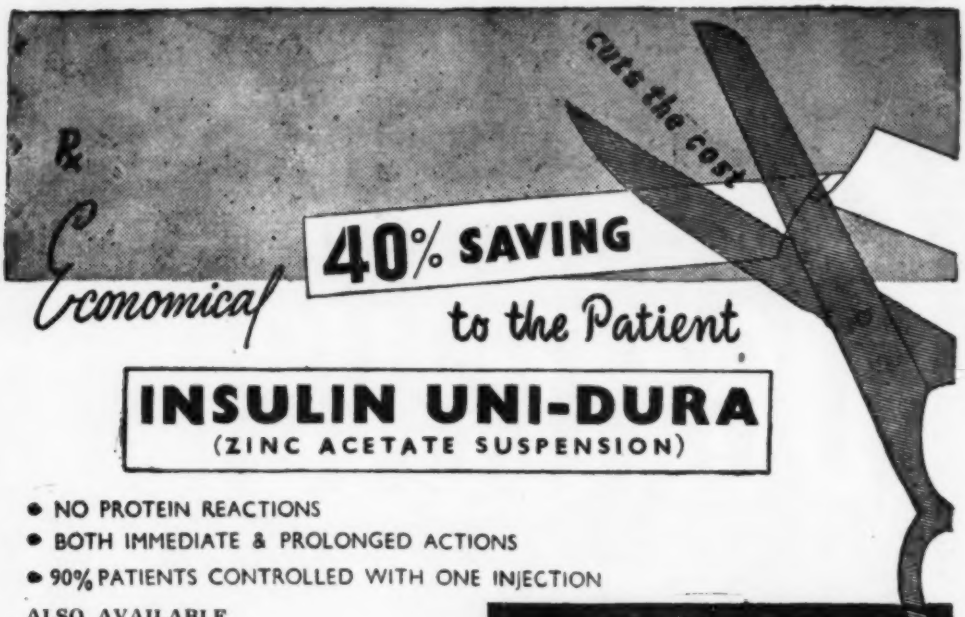


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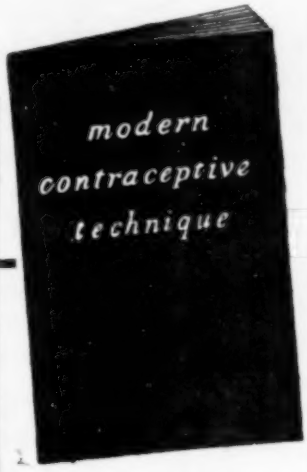


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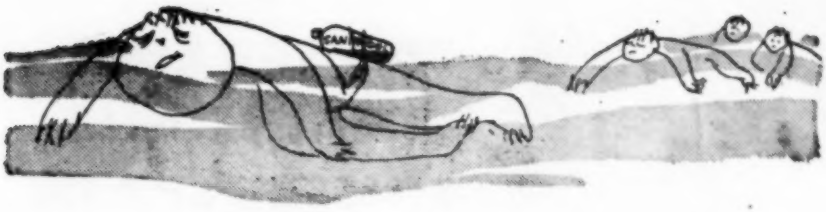

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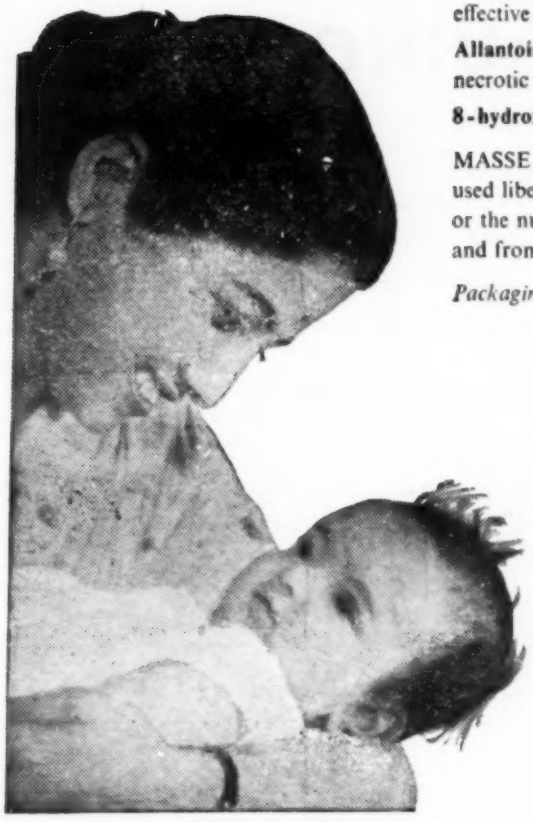

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EDITOR—P. K. GUHA, M.B., M.R.C.S. (ENG.), D.O.M.S. (LOND.)


*ORIGINAL ARTICLES*

## ABNORMAL HAEMOGLOBINS IN INDIANS IN SINGAPORE WITH TWO INSTANCES OF HAEMOGLOBIN L


F. VELLA, B.SC., M.D., M.A. (OXON.), A.R.I.C. (LOND.)

*Department of Biochemistry, University of Malaya in Singapore, Singapore*


### INTRODUCTION

The results of an investigation into the incidence of haemoglobin variants in a study of 1000 Indians residing in Singapore were recently recorded (Vella, 1958a). This study has now been extended to cover 2500 blood samples from unrelated Indian subjects residing in the Federation of Malaya and Singapore, and 222 samples from newborn infants. The findings in this study are presented.

### MATERIALS AND METHODS

The blood samples from adults were usually clotted ; 1700 came from healthy blood donors attending the Blood Transfusion Service at the General Hospital Singapore, and 800 from hospital patients suffering from a variety of disorders not primarily haematological. No attempt was made to classify samples according to the geographical origin of the donor or to religion, language spoken, etc. Information on family background and geographical origin was requested only when rare haemoglobin variants were detected.

The foetal blood samples were obtained from the umbilical cord after this was severed in infants delivered at the Kandang Kerbau Maternity Hospital, Singapore. These samples were collected in bottles containing potassium oxalate.

The haemoglobin solution submitted to electrophoresis was prepared by the method described by Chernoff (1955) and the paper electrophoretic technique employed was that already described (Brain and Vella, 1958). Sickling was tested for by the method of Daland and Castle (1948).

### RESULTS

ADULT BLOOD SAMPLES :

All samples in which an abnormal haemoglobin was present, contained a mixture of normal adult haemoglobin (A) amounting to 50-80 per cent of the total pigment and the abnormal haemoglobin amounting to 20-50 per cent. They were considered as representing the state of heterozygosity for the gene or genes responsible for the presence of the abnormal haemoglobin.

*Haemoglobin D*—This haemoglobin was found in 13 samples. It was identified by its paper electrophoretic properties and by the negative tests for sickling of the erythrocytes containing it. The paper electrophoretic mobility is identical with that of haemoglobin S but the presence of amounts detectable by this technique is invariably associated with positive sickling tests.

When sumbitted to study by a method involving electrophoresis and chromatography of trypsin-digested material, samples of haemoglobin D were found to fall into three distinct groups (called $D_\alpha$, $D_\beta$, $D_\gamma$ ) (Benzer *et al*, 1958). It was not possible to study these 13 samples of haemoglobin D by this method, and it is possible that they could be subclassified if so studied.

The incidence for haemoglobin D in this study is 0·52 per cent. A similar incidence was found in a study of 502 Indians in Uganda (Raper, 1957).

Amongst Sikhs and Gujaratis, incidence of 1·8 and 1·1 per cent respectively has been reported (Bird *et el*, 1956 ; Jacob *et al*, 1956). This haemoglobin was found in a Filipino family (Vella, 1958b) and in 3 out of 4000 Malays studied in Singapore at the same time. It was not found in European 'whites', Eurasians or Nepalese Gurkhas.

*Haemoglobin E*—This haemoglobin was present in 8 samples (0·32 per cent). In Singapore and Malaya this is the commonest abnormal haemoglobin found, being present in 4·9 per cent of Malays, 1·7 per cent of Eurasians, 0·54 per cent of Nepalese Gurkhas, and 0·3 per cent of Chinese [Vella, in the press (a) ; Vella and Field, 1958]. Chatterjea *et el* (1957, 1958) found this haemoglobin in 3·9 per cent of Bengali Hindus. It has also been detected in Ceylon, where it is the only abnormal haemoglobin so far encountered (Nagaratnam *et al*, 1958), and in Assam (Editorial, 1958).

*Haemoglobin J*—One instance (0·04 per cent) of this haemoglobin was found in a 33 year old male Sikh who originated from the Ludhiana district of Punjab. He was a healthy, blood donor.

This haemoglobin variant appears to be relatively uncommon. Three unrelated instances have been found amongst some 7000 Chinese, and one amongst 4000 Malays so far studied here. It has been found in a Gujarati Indian in Uganda (Raper, *loc. cit.*) and in two unrelated women (Gujarati-speaking from Lohana (Sanghvi *et al*, 1958). In one of the latter cases it was claimed to be present simultaneously with thalassaemia.

*Haemoglobin K*—A mixture of haemoglobins A and K was found in several members in four unrelated families.

In family 1, it was present in a mother and her two male children. The presenting member in this family was a psychotic undergoing treatment. The mother was of North Indian origin, but as she was adopted when young, she had no definite information on the geographical origin of her family.

In family 2, it was found in a father and his son. This family was Tamil-Muslim and originated from Nagapatnan.

In family 3, it was found in a mother and four of her children. The presenting case was a healthy blood donor. This family originated in Mayavaram. Detailed clinical, haematological and radiological findings in this family revealed no abnormality that could be attributed to the presence of the abnormal haemoglobin (Vella and Wells, 1959).

In family 4, it was found in a Tamil-Hindu male blood donor aged 20 years. No family study was possible.

Amongst Asians, this haemoglobin variant has only been described in Indians and Malays. Ager and Lehmann (1957a) detected it in two related East Indians in London. It has been found in two Malays in Singapore (Vella, 1958c).

*Haemoglobin L*—The trait for this haemoglobin was found in a 33 year old male blood donor who was born in Karachi of Sindhi parents. Its presence in the erythrocytes was not associated with anaemia or with any morphological abnormality of the blood cells A second instance was found in a 19 year old male Punjabi Sikh, studied through the courtesy of Dr. R. Bhagwan Singh of the Institute for Medical Research, Kuala Lumpur, Federation of Malaya. The identity of these samples was proved, using paper electrophoresis and ion exchange resin chromatography.

No reports of the finding of this haemoglobin have been made since the original description by Ager and Lehmann (1957b). Sukumaran *et al* (in the press) have found eight instances in three families in Gujarati-speaking Lohana caste in Bombay. They found no haematological disorders associated with the presence of this haemoglobin variant. (Dr. L. D. Sanghvi, Personal communication).

FOETAL BLOOD SAMPLES :

Amongst the 222 samples of umbilical cord blood studied, only two showed abnormal components in sufficient concentration to be detectable without staining of the electrophoretograms. In both instances, the abnormal component corresponded in its behaviour to that described by Fessas and Papaspyrou (1957). Amongst 1962 Chinese newborns studied at the same time, 63 (3·2 per cent) showed this abnormal component, 2 (0·1 per cent) showed "Bart's" haemoglobin (Ager and Lehmann, 1958) and 8 (0·4 per cent) showed the "Alexandra" variant [Fessas *et al*, 1959 ; Vella *et al*, 1959 ; Vella, in the press (b)].

## Summary

The incidence of abnormal haemoglobins in 2500 blood samples from adult Indians resident in Singapore and the Federation of Malaya and in 222 blood samples from newborn Indian infants delivered in Singapore is reported.

Amongst the adults, haemoglobins D, E, J, K and L were detected.

Amongst the newborn, the 'Fessas and Papaspyrou' type of haemoglobin was detected.

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# ABNORMAL HAEMOGLOBINS IN MYSORE

SUSHIELA SWARUP, M.B.B.S., S. K. GHOSH, B.SC.
H. B. KUNDU, M.SC.
AND
J. B. CHATTERJEA, M.D. (CAL.)

*From the Haematological Unit, Indian Council of Medical Research and the Department of Haematology, School of Tropical Medicine Calcutta*

Occurrence of abnormal haemoglobins in heterozygous or homozygous form or in combination with thalassaemia has been reported from different parts of India. The data at present available tend to indicate that the abnormal haemoglobins have a regional distribution in India. Thus Hb. D has so far been reported in Gujaratis and Punjabis (Lehmann, 1956/57) and Hb. E in Bengalees, Assamese and Nepalese (Chatterjea *et al*, 1956 ; Chatterjea, 1958). Recently from examination of samples of blood kindly sent by Dr. S. D. Khanna, Officer-in-Charge, Department of Pathology, Patiala Medical College, we could find an instance of Hb. E in a Jat Sikh family belonging to Patiala. Hb. S has so far been reported mostly from the aboriginal tribes (*Veddoids*) from South India (Lehmann and Cutbush, 1952 ; Foy *et al*, 1956), Madhya Pradesh (Shukla and Parande, 1956 ; Shukla *et al*, 1958), Bihari immigrants in Assam (Dunlop and Mazumdar, 1952 ; Batabyal and Wilson, 1958) and from Western India (Sukumaran *et al*, 1956 ; Nail *et al*, 1957). It must be mentioned that this tentative impression of regional distribution is based on data which are admittedly inadequate for a large country like India. Recently an opportunity arose to examine 550 subjects in the state of Mysore for sickling phenomenon. In 68 cases of this series, electrophoretic analysis of haemoglobin was also carried out. In view of the limited data available on abnormal haemoglobins in Indians, it was thought worthwhile to record our findings of 2 instances of abnormal haemoglobins in the series.

## MATERIAL AND METHODS

Subjects studied included individuals from various parts of Shimoga district. They belonged to different communities of Mysore. Their ages varied from 1 year to 60 years. There were 376 males and 174 females.

Sickling test was done according to the method of Daland and Castle (1948). Paper electro-

phoresis was done on 68 samples taken at random. Methods for preparation of haemolysates and electrophoretic analysis have been described previously (Chatterjea *et al*, 1956 ; Chatterjea *et al*, 1957).

### Results

Only one subject in the above series of 550, showed a strongly positive sickling phenomenon. On electrophoretic analysis this sample of blood showed a single peak which had a mobility slightly slower than that of Hb. A and corresponded to the electrophoretic mobility of a known sample of Hb. S. Family study revealed that both the parents were heterozygotes for Hb. S. This boy aged 4 years was grossly anaemic (Hb. 8·9 g. per cent) with Hb. S 90 per cent and Hb. F 10 per cent.

Electrophoretic analysis of haemolysate from a 20-year-old Hindu male subject from Sorab *taluk* showed 2 distinct peaks, one corresponding to Hb. A and the other with a mobility identical with Hb. S. The sickling test in this case was however negative on repeated examination and this case was therefore an instance of Hb. D in heterozygous state.

### Discussion

Presence of haemoglobin S has been reported from various parts of India and there is a general impression that it is found usually in the aboriginal tribes. In our previous study (Chatterjea *et al*, 1958) we have found it in a 10-year-old subject reported to have Rajput ancestry. In the present series the only instance of Hb. S was a *Harijan* boy suffering from sickle cell anaemia.

So far no case of Hb. D has been reported in Indians other than those from Gujarat and Punjab. The only subject showing haemoglobin D in this series was a *Harijan* resident of Shimoga district in the state of Mysore.

### Summary

This communication is presented to record the presence of haemoglobins S and D amongst the people of the Shimoga district in the state of Mysore.

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## INCIDENCE OF ABO AND Rh(D) BLOOD GROUP AMONGST BENGALEES

N. N. SEN, M.D., D.C.P.

*Lecturer in Haematology*

C. L. MUKHERJEE, M.O., F.R.C.O.G., PH.D.

*Director, Department of Obstetrics & Gynaecology*

AND

B. K. AIKAT, M.D., D.C.P., PH.D.

*Director, Department of Pathology & Bacteriology*
*Institute of Postgraduate Medical Education & Research, S. S. K. M. Hospital, Calcutta*

Reports on the incidence of Rh(D) type amongst the Bengalee population are very few. Greval and Roy Chowdhury (1943) investigated a small series of 200 cases and obtained an incidence of 81·5 per cent Rh positive, 8·5 per cent doubtful and 10 per cent Rh negative. In a latter communication (Greval and Roy Chowdhury, 1946), these workers reported an incidence of 7·8 per cent Rh negative in another series of 200 cases. Das

Gupta (1944) obtained 10 per cent Rh negative in 240 Bengalees. These two groups of workers used antisera from rabbits immunised by red cells from rhesus monkey. Using human Rh (D) antiserum, Roy *et al* (1959) reported an incidence of 5·3 per cent Rh (D) negative in a selected group of 1435 Bengalees. The body of data on the incidence of ABO blood groups amongst the Bengalee population is, however, considerable and has been tabulated by Mourant *et al* (1958).

In the Division of Haematology, Department of Pathology & Bacteriology, ABO blood grouping and Rh (D) typing is undertaken as a routine in all cases attending the Antenatal Clinic of the Department of Obstetrics and Gynaecology, S. S. K. M. Hospital, Calcutta. This afforded us an opportunity to investigate a large sample of unselected Bengalee women for the ABO and Rh blood groups. The present communication describes the results of this investigation.

## Material and Methods

2,200 consecutive unselected Bengalee women attending the Antenatal Clinic were tested for ABO blood group and Rh (D) type. High titre anti-A and anti-B sera were obtained from the Haffkine Institute, Bombay, and ABO grouping tests were performed by slide method. In doubtful cases, which were very few, the tube method was employed. Human anti-D Rh sera were obtained from Ortho Pharmaceutical Corporation, New Jersey, and a slide method of agglutination was performed on oxalated blood samples at 37°C as specified by the manufacturer. In doubtful cases, the tube method using saline agglutinin (anti-D) was employed. In view of the high cost and relative unavailability of human Rh antiserum, tests were restricted to the detection of D antigen only.

## Statistical Methods

In the ABO system A, B and O serve as symbols of phenotypes as well as of genes. For denoting gene frequencies, the letters p, q and r indicate the frequencies of the genes A, B and O rspectively. The gene frequencies in the ABO system has been calculated according to the following formulae:

$$p=(1-\sqrt{O+B})\left(1+\frac{D}{2}\right)$$

$$q=(1-\sqrt{O+A})\left(1+\frac{D}{2}\right)$$

$$r=1-p-q$$

where $D=\sqrt{O+A}+\sqrt{O+B}-\sqrt{O}-1$

and $O$, $A$ and $B$ = frequency of respective phenotypes in the population.

The reciprocal of the standard deviation ($\sigma$) of

$$D=\sqrt{2N\left(1+\frac{r}{pq}\right)}$$

where N = number of persons tested; so that

$$\frac{D}{\sigma}=D\times\sqrt{2N\left(1+\frac{r}{pq}\right)}.$$

The result of $D/\sigma$ carries either a plus or minus sign and serves to indicate whether group AB is in deficiency or in excess respectively. For homogenous populations, accurately tested, the value of $D/\sigma$ should not lie outside the limits of $\pm 2$ more than once in 20 times. While values less than $\pm 2$ for $D/\sigma$ serve primarily as criteria of genetic homogeneity, higher values may be due to inaccurate testing as well as to heterogeneity (Mourant *et al*, 1958).

The above method of calculation has been preferred to others for the sake of comparison with the available data on the ABO blood group surveys compiled by Mourant *et al* (*loc. cit.*) where similar method was employed.

In the Rh system, since only anti-D serum has been used, phenotypes are represented by D+ (D positive) and D− (D negative) respectively. Phenotypes D+ consist of genotypes DD and Dd while phenotype D− belongs to the genotype dd.

Gene frequencies for D and d are calculated from the following:

$$d=\sqrt{dd}$$

$$D=1-d$$

where dd = genotype frequency of dd (i.e., the frequency of phenotype D negative).

Genotype frequencies are calculated as follows:

$$DD=D^2,\quad Dd=2\ (D\times d)\ \text{and}\ dd=d^2$$

Frequency of gene, genotype or phenotype is indicated by the appropriate letter with a bar over it. Frequencies are expressed in a manner so that the sum of the frequencies of the different groups in a given system is unity. Gene, genotype or phenotype percentage is obtained by multiplying the respective frequency by 100.

## Results

The distribution of ABO blood groups in 2,200 unselected Bengalee women of the child-bearing age is given in Table 1.

Table 1

| No. of persons tested | O | A | B | AB |
|---|---|---|---|---|
| 2200 | 730 | 489 | 818 | 163 |

Phenotype percentage, gene percentage and the value for $D/\sigma$, are represented in Table 2.

TABLE 2

| Phenotype per cent | | | | Gene per cent | | | $\frac{D}{\sigma}$ |
|---|---|---|---|---|---|---|---|
| O | A | B | AB | p | q | r | |
| 33·0909 | 22·2272 | 37·1818 | 7·4090 | 16·2486 | 25·7771 | 57·9743 | +1·64 |

The results of Rh (D) type of the same sample is recorded in Table 3.

TABLE 3

| Total No. of persons tested | Phenotype per cent | | Genotype per cent | | | Gene per cent | |
|---|---|---|---|---|---|---|---|
| | D+ | D− | DD | Dd | dd | D | d |
| 2200 | 97·00 | 3·00 | 68·36 | 28·64 | 3·00 | 82·68 | 17·32 |

## DISCUSSION

The results of the distribution of ABO blood groups of this series indicates a value of + 1·64 for $D/\sigma$. This suggests that there is a deficiency of group AB as compared to the number expected on the basis of a genetic equilibrium. Mourant (1954) pointed out that among the results of the most carefully and competently conducted surveys, there was more often a deficiency than excess of AB. He discussed a number of possibilities for such an anomaly. Since A genes produce widely varying quantities of A antigen, the level at which the error occurs depends upon the care with which a work is conducted and upon the quality of anti-A serum used. For example, a serum while detecting $A_2$ in the genotype $A_2O$ may fail to detect $A_2$ in the genotype $A_2B$. Similarly, a number of $A_2B$ blood may be recorded as B. Thus at whatever level of discrimination one may be working, there will always be a tendency towards an apparent deficiency of AB. Amongst other causes, Mourant (*loc. cit.*) stated that an undue proportion of AB foetuses fail to survive long enough to be blood-grouped in surveys. Or, if the population consists of subpopulations which are partly or completely endogamous, the frequency of heterozygotes such as AB will be less.

The method of calculating $D/\sigma$, as employed in our investigation, however, permits of a value not exceeding $\pm 2$ to be used primarily as a criterion of genetic homogeneity (Mourant *et al*, 1958). The present series, then, represents a homogenous population in genetic equilibrium. In a population in genetic equilibrium, the gene frequencies in the two sexes are equal for all other than sex-linked genes and genes which are more harmful to one sex than the other (Boyd, 1950 ; Mourant, 1954). Since the genes for ABO and Rh system are autosomal genes and are not known to have more harmful effect to one sex than the other, it may be assumed that the results of our survey conducted on women only may likewise represent the incidence and frequency of ABO and Rh types in Bengalee males. In other words, the results of our survey represent the incidence and frequency of ABO and Rh blood groups of the Bengalee population.

With the above assumption, the incidence of Rh (D) negative amongst the Bengalee population is only 3 per cent. This figure is not in accord with the results of Greval and Roy Chowdhury (1943, 1946) and Das Gupta (1944). That these investigators tested small samples and did not use human anti-Rh (D) serum might serve to explain the differences in the results. Since the series of Roy *et al* (1959) represents a selected group consisting of blood donors, patients referred for transfusion reaction or for the possibility of Rh incompatibility and cord blood, their results of 5·3 per cent Rh negative is unlikely to indicate the true incidence in an unselected Bengalee population.

The incidence of Rh (D) negative in a population is of special significance in clinical obstetrics in relation to the haemolytic disease of the newborn. The incidence of haemolytic disease of the newborn due to Rh iso-immunisation is directly related to the incidence of D-negatives of a population. Schwartz and Levine (1943) assessed the incidence of the disease in America to be 1 in 200 deliveries where the proportion of Rh D-negative individuals ranges between 15 and 17 per cent of the population. Based upon the above calculation, the expected incidence of haemolytic disease of the newborn in the Bengalee population with a 3 per-cent D-negative rate would be about 1 in 1000 deliveries. There is, however, a regrettable lack of reported study on the incidence of this disease in the Bengalee population. In the maternity indoor of the S. S. K. M. Hospital during the two year period of 1957 and 1958, no case of haemolytic disease of the newborn due to Rh iso-immunisation was observed out of a total delivery of 1676 mothers. Gurevitch *et al* (1947) reported that among Jews in Palestine with an average incidence of 9·6 per cent D-negatives, only 6 cases of the disease were observed in 12,645 deliveries over

a period of 8 years. The incidence of the disease in the newborn of D-negative women was 1 in 210 as compared to a rate of 1 : 20 to 1 : 40 reported in Caucasian races. These workers presumed that this was due to a low susceptibility to become immunised. In a later communication these workers (1948) reported that in a group of 32 D-negative multiparae who had from 6-14 pregnancies no evidence of iso-immunisation was obtained although the husbands were all homozygous Rh (D) positive except 3. Similar study on the incidence of iso-immunisation in D-negative mothers in the Bengalee population may be of interest.


### Summary

2200 unselected consecutive Bengalee women attending the Antenatal Clinic have been tested for ABO and Rh(D) blood groups. The results have been statistically analysed to express phenotype percentage and gene percentage in the ABO system and phenotype percentage, genotype percentage and gene percentage for Rh(D). It has been shown that the population tested is genetically homogenous. 3 per cent Rh(D) negative rate among the Bengalee population has been discussed in its relationship to the haemolytic disease of the newborn due to Rh iso-immunisation.



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## INCIDENCE OF Rh IN THE PUNJABI FEMALE


UPENDRA NATH PATHAK, M.B.B.S. (PB.), D.G.O. (DUB.), D. (OBST.), R.C.O.G., L.M. (ROT.)

*Registrar Obstetrics and Gynaecology, Hope Hospital, Salford 6, Lancashire, England*


The incidence of Rh has been widely studied and reported all over the world. In almost all populations, the percentage of Rh negative individuals is much lower than the Rh positive ones. Although among Australian aborigines, Fijians, Filipinos, Japanese and Chinese the Rh character does not seem to exist at all, the incidence in the rest of South Western Asia seems to be related to the Southern Europe and the Mediterranean basin, where the frequency of r is usually low, and that of $R_1$ higher than further north (Mourant, 1954).

Following the partition of the subcontinent, the population of Punjab State was almost entirely Hindu and Sikh. The opportunity was unique. It was considered that the incidence of Rh in this homogenous population would give a fair idea of the distribution in the whole state. Hence this study was undertaken to investigate the incidence of Rh in the female population of Punjab at the Government Hospital for Women, Amritsar, during the period December, 1954 to September, 1955.

### Material

In all, 820 cases were subjected to the Rh tests. These included 550 unselected cases.

(i) 366 pregnant cases
(ii) 84 non-pregnant cases
(iii) 100 unmarried women students of the Medical College, Amritsar.

These students give a fairly good cross-section of the state, the admission to the Medical College being open to competition on a state wide scale.

There was another idea. The women students having readily voluntered, a donor panel was formed of Rh negative cases to be useful in emergencies.

In addition, another 250 cases were subjected to Rh tests. These cases cannot exactly be termed 'random' because these primarily included pregnant women attending the gynaecological outpatients department, the antenatal clinic and the patients admitted to the antenatal wards of the hospital. Almost all these cases had given history of one or more abortions or premature stillbirths preceding the present pregnancy and so were advised Rh determination.

Included in this are also 4 cases of hyperemesis gravidarum, 3 of pre-eclampsia, and 19 of habitual abortion.

Twenty cases were referred from the children's clinic, V. J. Hospital, Amritsar. All these children gave a history of neonatal jaundice and suffered from cerebral diplegia (1), kernicterus (5), chorea (1), jaundice (5), hepatosplenomegaly (4), idiocy (2), congenital malformations (1), and perceptive deafness (1).

## Method

In the early part of the work, the blood samples were subjected to Rh testing by the test tube method of Wiener. The serum was obtained from his laboratory at Brooklyn, New York, U.S.A. The results were checked with Chown's method. However, towards the latter part of the survey we switched to the Diamond's slide method because it was quicker, as reliable, and most important, the supplies of stock saline serum for the test tube method ran short.

## Results

Out of the 550 unselected cases attending the out-patients department, we found 40 cases (7·27 per cent) Rh negative. This included 100 lady students of the Medical College, Amritsar. The rest, i.e., 510 cases (92·73 per cent) where Rh positive.

The series was continued, however, and another 250 cases were examined, but these included cases referred to us by the various hospitals as being of a suspected Rh incompatibility.

We found 19 (7·6 per cent) Rh negatives and 231 (92·4 per cent) Rh positives amongst them. This, however, cannot be taken as a true index of the population because of the element of selection.

*Incidence of blood groups*—The incidence is shown in Table 1.

Table 1—Showing Incidence of Blood Groups

| Blood group | No. found | Percentage |
|---|---|---|
| A ... ... | 117 | 21.27 (22·3) |
| B ... ... | 222 | 40·36 (38·8) |
| O ... ... | 158 | 28·73 (30·6) |
| AB ... ... | 53 | 9·64 ( 8·3) |

Figures in parentheses are of Talwar and Sawhney (1958).

There are different views regarding distribution of Rh negative individuals in the different A, B, O groups. Broman (1944) reported a disproportionately low incidence of Rh negatives in group A but the findings have not been confirmed ever since. The distribution in the series under review is shown in Table 2.

Table 2—Showing Distribution of Rh Negative Individuals

| Blood Group | Total | Rh Negative | Percentage |
|---|---|---|---|
| A ... | 117 | 9 | 7·69 |
| B ... | 222 | 16 | 7·20 |
| O ... | 158 | 11 | 6·96 |
| AB ... | 53 | 4 | 7·55 |
| Total ... | 550 | 40 | mean 7·35 |

*Distribution according to age-groups*—Age has no direct influence on the distribution of Rh, but as the hospital population mostly belongs to the 15-24 years group, followed very closely by the 25-34 years, 35-44 years and 45 years onwards groups, a maximum number of cases were found in the 15-24 years group.

Table 3—Showing Distribution of Rh Negative Cases According to Age-Groups

| Age-group in years | Total | Rh Negative | Percentage |
|---|---|---|---|
| 15—24 ... | 241 | 17 | 7·05 |
| 25—34 ... | 218 | 16 | 7·34 |
| 35—44 ... | 66 | 5 | 7·58 |
| 45—onwards ... | 25 | 2 | 8·00 |
| Total ... | 550 | 40 | mean 7·27 |

The percentage of Rh negative individuals follows the general distribution (7·27 per cent) closely and this is what is expected because the Rh status, like that of A,B,O and M,N blood groups, is permanent and does not change by any circumstances during the lifetime of a person.

*Distribution according to religious groups*—The bulk of the out-patient population can be broadly divided into two sub-groups—Hindus and Sikhs, the former predominating in urban areas, as also in the hospital population. Out of a series of 550 cases as many as 225 were Sikhs, the remaining 325 being Hindus. The distribution of Rh into two main sub-groups is not much different (Table 4) because of the fact that the two are intermarrying, socially miscible units.

TABLE 4—SHOWING DISTRIBUTION OF RH NEGATIVE CASES ACCORDING TO RELIGION

| Religion | | Total | Rh Negative | Percentage |
|---|---|---|---|---|
| Hindu | ... | 325 | 22 | 6·77 |
| Sikh | ... | 225 | 18 | 8·00 |
| Total | ... | 550 | 40 | mean 7·39 |

*Distribution according to rural and urban populations*—Out of 550, as many as 310 belonged to the city while the rest, 240 cases, were rural. There is no difference in the distribution of Rh amongst the two (Table 5).

TABLE 5—SHOWING DISTRIBUTION OF RH NEGATIVE CASES ACCORDING TO RURAL AND URBAN POPULATIONS

| Type | | Total | Rh Negative | Percentage |
|---|---|---|---|---|
| Urban | ... | 310 | 22 | 7·09 |
| Rural | ... | 240 | 18 | 7·50 |
| Total | ... | 550 | 40 | mean 7·295 |

*Distribution in pregnant and non-pregnant women*—In all we examined 366 pregnant and 184 non-pregnant women. The incidence, although not wide apart, was a little higher in the former (Table 6). The only plausible explanation could be that the woman who had already met with an accident in the form of a miscarriage or stillbirth was anxious to avoid the repetition of the same in her present pregnancy and came to the hospital for a check-up, where she was referred for Rh determination. This, perhaps, led to a higher percentage amongst the pregnant group.

TABLE 6—SHOWING DISTRIBUTION OF RH NEGATIVE CASES AMONG PREGNANT AND NON-PREGNANT WOMEN

| State | | Total | Rh Negative | Percentage |
|---|---|---|---|---|
| Pregnant | ... | 366 | 28 | 7·6 |
| Non-pregnant | ... | 184 | 12 | 6·5 |
| Total | ... | 550 | 40 | mean 7·05 |

During the period under survey 895 deliveries took place in the Government Hospital for Women, Amritsar. We examined all newborn babies clinically. In all cases of stillbirths, anaemia, or neonatal jaundice, Rh tests were done. We came across only one case of erythroblastosis, giving an incidence of 1 : 895.

## DISCUSSION

The incidence of Rh factors has been reported variously from the different states of India. (Table 7).

TABLE 7—SHOWING COMPARATIVE INCIDENCE OF RH NEGATIVES

| Group tested | Author and year | No. of samples tested | Rh negative per cent |
|---|---|---|---|
| Indians (Calcutta) | Greval & Roy Chowdhury (1943) | 200 | 10·00 |
| Indians (Calcutta) | Do. (1946) | 200 | 7·80 |
| Indians (Calcutta) | Das Gupta (1944) | 240 | 10·00 |
| Bengalees (Calcutta) | Roy *et al* (1959) | 1435 | 5·29 |
| Indians (Bombay) | Khanolkar & Sanghvi (1945) | 100 | 2·00 |
| Koksnath Brahmans (Bombay) | Sanghvi & Khanolkar (1949) | 200 | 3·5 |
| Chandaseniya Prabhus (Bombay) | Do. (1949) | 200 | 10·00 |
| Indians (Lucknow) | Mazumdar (1948) | 116 | 5·43 |
| Indians (Madras) | Ranganathan *et al* (1946) | 145 | 4·10 |
| South Indians (Madras) | Ranganathan *et al* (1948) | 294 | 8·50 |
| South Indians | Row (1952) | 132 | 3·79 |
| Indians (Amritsar) | Pathak (1954) | 227 | 7·49 |
| Indians (Female) (Punjab) | The present series | 550 | 7·27 |

Khanolkar and Sanghvi (1945) attempted to explain this obvious paradox of different incidence in the different states by drawing attention to the social composition of India. Indians include Hindus, Moslems, Tribes and the rest consisting of Christians, Sikhs, Buddhists, Jains, Parsees and Jews.

In our series, most of the people represented the lower and the lower middle classes of society—Sikhs constituting as prominent a component as Hindus (to be precise 225 out of 550). Sikhs, however, are primarily a recent offshoot of Hindus and have always been intermarrying with Hindus. Genetically the two cannot be considered separate.

On the whole the out-patient population of the Government Hospital for Women represented a fairly homogenous component of Punjabi Society from which Moslems had been excluded entirely because of the division of the subcontinent. The only admixture is from an occasional Garhwali which, however, we have tried to avoid as far as possible.

The only contemporary work in the Punjab is that of Pathak (1954). He reported the incidence for males and females combined to be 7·49 per cent ; for females alone it was 12·28 per cent (7 out of 57), but there are two points for criticism, viz.,

(a) The series is very small, consisting of only 57 cases.

(b) The cases are not unselected. On the other hand, the element of selection is quite prominent because he includes the cases referred to him for suspected Rh incompatibility.

While going over the results it became apparent that the variation amongst the different Rh negative values calculated by grouping the samples under different categories is not significant. Therefore, it may be safely concluded that the average value of Rh negatives for the various groups, irrespective of their variations in blood groups, age, religion, mode of life as to whether they are living in villages or cities, or whether they are pregnant or non-pregnant is about 7·263 per cent.

The second statistical investigation was conducted to study the variation in the Rh negative values, amongst themselves, in the various groups. It was very interesting to observe that the ultimate average was practically the same. Hence it was concluded that the Rh negative percentage of the female population of the Punjab State may be correctly assumed as 7·263 per cent (7·3 per cent).

## Summary

There were 40 Rh negative females in a total of 550, giving an incidence of 7·27 per cent (corrected to 7·3 per cent).

In our series the incidence of the various blood groups was :

A—21·27 per cent, B—40·36 per cent, O—28·73 per cent and AB—09·64 per cent.

The distribution of Rh negatives in various blood groups was fairly equal.

The Rh distribution is not influenced by age, religion, state of pregnancy or habitat of people, whether rural or urban.

There was 1 case of erythroblastosis out of 895 deliveries in the hospital during the period under survey, giving an incidence of 1 : 895.

## Acknowledgments

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# VERATENSHUN IN PRE-ECLAMPTIC TOXAEMIA

M. K. KRISHNA MENON, B.A., M.D.
*Director*
AND
V. RAMANAMMA, M.B.B.S., D.G.O.
*Research Assistant*
*Institute of Obstetrics and Gynaecology*
*Government Hospital for Women and Children*
*Madras*

The aetiology of pre-eclamptic toxaemia still remains obscure. As the present concept of the pathology of this condition stresses the importance of pressor activity it has became almost a habit to use some kind of hypotensive drug to reduce spasm and thus bring about a reduction of blood pressure. Varying claims have been made as each new drug was put forth. What is required in pre-eclamptic toxaemia is a hypotensive drug which will bring down the blood pressure in quick time and continue to maintain this lowered level at normotensive levels throughout pregnancy, while at the same time it should have no adverse effects. It should be safe to the mother and child and free from intolerable side-effects. No single hypotensive drug seems to satisfy all the above requirements. Hence at present a combination of two or more hypotensive drugs is considered superior to a single drug.

The present paper is based on a study of the effects of veratenshun, a proprietary preparation consisting of protoveratrine, reserpine and serpentina alkaloids, in pre-eclamptic toxaemia of pregnancy.

Protoveratrine is a purified alkaloid of *Veratrum album*. The hypotensive action of veratrum is due to its effect on the vasomotor centre through the carotid sinus and aortic arch receptors. It has no effect on renal function. Cardiovascular resistance is decreased but the cerebral blood flow remains unaltered. There is slowing of the heart rate. The margin of safety between therapeutic and toxic doses is narrow and constant supervision is required.

Reserpine is a complex heterocyclic compound isolated from the roots of serpentina plant (Muller *et al*, 1952). It acts on the hypothalamus thereby producing tranquillising effect. The lowering of blood pressure with reserpine apart from its action on the hypothalamus may also be due to its action on the brain stem and peripheral vessels. The hypotensive response takes about 2-6 days to appear and disappears slowly in 1-5 weeks. Side-effects are infrequent and mild in the form of nasal block, drowsiness, diarrhoea, bradycardia, vomiting and vertigo. There is a wide margin of safety between the therapeutic and toxic doses of the drug. The drug shows remarkable synergistic properties when used in conjunction with other hypotensive agents.

Veratenshun can be given parenterally and orally.

Each ml. of veratenshun for intravenous use consists of: protoveratrine 0·15 mg., reserpine 2·5 mg. and serpentina alkaloids 4 mg. while each tablet consists of protoveratine 0·2 mg., reserpine 0·15 mg., serpentina alkaloids 3 mg., phenobarbitone sodium 15 mg., pentaerythritol tetranitrate 15 mg. and homatropine methyl bromide 2 mg.

## Methods and Material

Only cases of pre-eclamptic toxaemia were chosen for the study. If there was any doubt about the diagnosis, the case was discarded from the final assessment. Cases of hypertension complicating pregnancy with or without superimposition of pre-eclamptic toxaemia therefore do not find a place in this study. The cases of toxaemia were divided into two groups—grade A (mild) and grade B (severe). The criteria were as follows:

Grade A (Mild)—These patients had a blood pressure of between 140 and 160 mm. of Hg systolic and between 90 and 100 mm. of Hg diastolic. They had albuminuria one plus or less, had oedema not greater than two plus and symptoms like headache were usually absent but, if present, were mild.

Grade B (Severe)—Patients in this category had oedema two plus or more, blood pressure constantly over 160 mm. of Hg systolic and 100 mm. of Hg diastolic and albuminuria two plus or more. In addition, the majority of them had symptoms like headache, some had vomiting, restlessness and visual disturbances.

All patients in this study were admitted into hospital and treated for 48 hours with complete rest in bed, sedation with phenobarbitone, restricted salt in diet and diamox 250 mg. a day. At the end of 48 hours they were graded into 'A' and 'B' and treatment with veratenshun started in addition to the usual general lines of management. No sedatives were administered while the patient was on the drug.

A total number of 140 cases was studied. 90 of them were antenatal and 50 in labour. Among the 90 antenantal cases there were 20 cases of grade 'A' and 70 cases of grade 'B'. All the 50 cases in labour belonged to grade 'B'.

*Grade A*—To start with these cases were given one tablet of veratenshun twice or thrice a day, gradually increasing by one tablet daily till the optimum dose was reached. Not more than 8 tablets per day was given. Blood pressure was recorded twice a day. Majority of these mild cases were about 34-36 weeks pregnant and hence were kept in the hospital till delivery.

*Grade B*—12 cases were treated with tablets given orally. As the response was very poor oral medication was discontinued. They were treated as follows: 1 cc. of veratenshun in 20 cc. of 20 per cent glucose solution was given intravenously. Blood pressure and pulse were recorded every five minutes for fifteen minutes; every 15 minutes for one hour; every half hour for 2 hours; at hourly intervals for 4 hours and thereafter every 4 hours for the rest of the stay in hospital. A close watch was kept for any untoward effect. In cases where the blood pressure came down to normal levels or a reasonably hypotensive effect was evident after the first injection, oral therapy (one tablet three to four times a day) was used as a supplement. Where no or poor hypotensive effect was noticed after the initial injection, it was repeated at intervals of 6-8 hours. In no case were the injections repeated more than three times in twenty-four hours. The maximum number of injections given to any one patient was seven in four days.

It was difficult to standardise the dose and each case was individualised and treated. The duration of treatment varied considerably; the important influencing factors being the severity of toxae-

mia, the duration of pregnancy and response to treatment. In 75 per cent of cases it ranged from 4-15 days. In a very small number of cases it was continued for 4-5 weeks. An elderly primigravida with pre-eclamptic toxaemia grade 'B' was treated on the above lines for 70 days and then delivered by caesarean section of a healthy mature live baby.

The pulse, urinary output and any reactions to the drug were all recorded. Every attempt was made to carry pregnancy to beyond 36 weeks to improve the foetal prognosis. If, however, response to treatment was poor and the patient's condition deteriorated, labour was induced prematurely. The method of choice has been intravenous pitocin drip combined with artificial rupture of membranes. The duration of pregnancy in grade 'A' and grade 'B' ranged from 20 weeks to 36 weeks. A response was considered 'good' when a normotensive state was achieved and maintained throughout the hospital stay. When a hypotensive effect was achieved without a normotensive state being attained or if a normotensive effect was achieved but could not be maintained, it was considered a 'fair' response. Results were classified as 'poor' when there was either no response or when the hypotensive response was transitory. All assessments were made prior to delivery.

## Observations

Results of treatment of grade 'A' cases are shown in Table 1. Table 1 also shows the results for comparison obtained in the same type of cases treated without any hypotensive. Only cases with complete records including delivery are included.

It is obvious that in grade 'A' cases oral therapy has not in any way improved the results. Practically the same results have been achieved without the use of any hypotensive. Table 2 gives the results of treatment in grade 'B' cases.

In grade 'B' cases oral therapy alone was not found to be useful—it was found to be effective only for maintenance of hypotensive or normotensive levels, when once the blood pressure was brought down by intravenous injection of veratenshun. It was observed that within a few minutes (15 minutes) after the intravenous injection the blood pressure began to drop in a great majority of the cases (80 per cent). The minimum time for the fall in blood pressure was 5 minutes and the maximum four hours, average being 40 minutes. If there was no response within four hours, then one should assume that the drug has failed to act. The maximum drop noticed was 110 mm. of Hg systolic and 70 mm. of Hg diastolic, the average being 39.5 mm. and 22.5 mm. respectively. Another feature observed was that the higher the systolic pressure at the time of injection the greater the drop.

The hypotensive effect lasted from 1-26 hours, the average being 11 hours. In 70 per cent of cases normotensive effect lasted for 6-8 hours with one injection. No untoward effects were observed except vomiting in 4 cases and flushing of face

Table 1—Showing Results of Treatment in Grade A Cases

| Treatment | No. of cases | Response in per cent | | | Induction rate per cent | Prematurity per cent | Perinatal mortality per cent | Eclampsia per cent |
|---|---|---|---|---|---|---|---|---|
| | | Good | Fair | Poor | | | | |
| Veratenshun (oral) | 20 | 30 | 60 | 10 | 5 | 15 | 10 | nil |
| Control ... | 110 | 62·8 | 29·1 | 8·2 | 8·6 | 10 | 9·1 | 4·1 |

Table 2—Showing Results of Treatment in Grade B Cases

| Treatment | No. of cases | Response in per cent | | | Induction rate per cent | Prematurity per cent | Perinatal mortality per cent | Eclampsia per cent |
|---|---|---|---|---|---|---|---|---|
| | | Good | Fair | Poor | | | | |
| Veratenshun (intravenous) ... | 70 | 12·9 | 75·7 | 11·4 | 18 | 22 | 18·6 | 2·8 |
| Control ... | 150 | 20 | 40 | 40 | 12·6 | 21·3 | 19·3 | 3 |

with nasal congestion and profuse sweating in one case. There was a tendency for bradycardia, the average drop in pulse rate being 15 beats per minute. No appreciable change in urinary output was noticed. In one patient who was 28 weeks pregnant with grade 'B' toxaemia, there was a sudden fall in blood pressure (from 180/110) to a very low level (78/40) and the foetal heart sounds disappeared. There was, however, no premature separation of the placenta.

It was observed that even though the response was 'poor' in only 11·4 per cent of cases by using veratenshun as compared to 40 per cent in the control group, in the ultimate assessment of the results, this drug has not helped us to reduce the prematurity rate and perinatal mortality rate. It indicates once again that in the management of pre-eclamptic toxaemia, control of hypertension alone is not likely to improve foetal mortality.

Among the 70 grade 'B' cases, 2 developed eclampsia, one antepartum and one intrapartum Three patients developed accidental haemorrhage (revealed type). One case of severe toxaemia with twins had haematuria during labour. Two cases were delivered by caesarean section one an elderly primigravida and the other a repeat caesarean section. Five of the 70 cases had severe anaemia and in addition 2 had ascites. In this series there was one maternal death due to severe anaemia with amoebic dysentery 10 days after delivery.

*Veratenshun in labour*—In 50 patients with grade 'B' pre-eclamptic toxaemia, veratenshun in 20 cc. of glucose was given intravenously. Blood pressure and pulse were recorded every five minutes for 15 minutes and every 15 minutes for half an hour ; every half an hour for a couple of hours and thereafter every hour. The injection was repeated whenever the blood pressure rose above 160/100 mm. Hg. In the majority of cases (70 per cent) one injection itself was found sufficient. In 20 per cent two injections were needed. Only in one case the injection was repeated four times over a period of 45 hours. In 8·5 per cent of cases the hypotensive effect was transitory and insignificant. In 80 per cent of cases blood pressure came to normotensive level or near that within thirty minutes. Average time within which the maximum fall in blood pressure was noticed was 30 minutes. The systolic drop varied from 10 to 100 mm. of Hg, average being 40 mm. of Hg ; the diastolic drop ranged between 10-70 mm. of Hg, average being 25 mm. of Hg. The average time during which blood pressure maintained at normotensive or hypotensive levels was six hours. 80 per cent of cases delivered on an average within 8 hours of the first injection. In the rest labour lasted for more than eight hours and in one case it lasted for 45 hours during which the drug was repeated four times. Patients who delivered within half an hour of the injection were excluded from this series. Among these 50 cases one developed eclampsia during labour and one an hour after delivery inspite of the blood pressure having been kept low. Urinary output was satisfactory. The fall in the pulse rate was the same as during pregnancy. There were no untoward effects noticed either in the mother or foetus, which could be attributed to the drug.

We found veratenshun given intravenously exceedingly useful in controlling the blood pressure rises in labour.

## Discussion

Protoveratrine by itself has proved to be a potent drug in the control of toxaemia of pregnancy as reported by Krupp *et al* (1956) without the dangers of heavy sedation and interference with adaptive reflexes. The action is quick but short-lived. The haemodynamic effects are due to its vasodilatation effect. Toxic manifestations like vomiting, etc., are very rare and transient. There are favourable reports on the use of sepentina group of alkaloids in pre-eclamptic toxaemia (Rakshit, 1956 ; Rogers *et al*, 1957) though our experiences with serpasil have been disappointing. A combination of hypotensives has been suggested to be more useful in these cases and veratenshun, being a combination of protoveratrine and reserpine, stood out as a promising drug. From our studies we find that oral medication is very slow and uncertain in its effects and for severe types of toxaemia it is not of value. However when veratenshun is used intravenously it is possible to control the blood pressure in over 80 per cent of cases and this hypotensive effect could to a certain extent be maintained by oral therapy. Even so we realise that in the severe grades of toxaemia, it has not helped us to improve the prematurity rate and perinatal mortality.

We repeat that control of hypertension alone is not sufficient to improve the foetal prognosis. Until the aetiology of toxaemia is discovered, the treatment will have to continue on the same empirical lines as at present.

However, there is another aspect of the problem. Labour in a patient with severe toxaemia is always fraught with danger in that very high rises in blood pressure are liable to occur which may precipitate an attack of eclampsia or a cerebral vascular episode. It is therefore imperative that these rises in blood pressure should be controlled immediately. It is here that we have found veratenshun very valuable. In over

80 per cent of cases a good control of the blood pressure in labour could be obtained within half an hour and we have been able to keep it at reasonable hypotensive levels in these cases with one injection. In a smaller number where a good control was not obtainable or the pressure started rising again, a second injection often had the desired effect. We have had no untoward side effects worth mentioning and we are satisfied with the benefits obtained by using this drug in labour.


### Summary

140 cases of pre-eclampic toxaemia—90 antepartum and 50 intrapartum—were given veratenshun to control the blood pressure.

Of the 90 antepartum cases 20 were grade 'A' and 70 were grade 'B' pre-eclamptic toxaemia.

Grade 'A' cases were given veratenshun orally. The control of blood pressure and the incidence of prematurity, perinatal mortality and induction rate was in no way better than the cases treated without hypotensives.

Grade 'B' cases were treated with veratenshun 1 cc. given intravenously and supplemented by oral therapy after control of blood pressure. 'Good' to 'fair' control of blood pressure was obtained in 85 per cent of cases. Even so the perinatal mortality and prematurity rate was in no way different from the series treated without hypotensives.

50 cases of grade 'B' toxaemia in labour were given veratenshun intravenously for the control of blood pressure. The results have been very gratifying in that in over 80 per cent of cases, a marked hypotensive effect was obtainable within half an hour and thus hypotensive effect continued for over four hours.

No untoward side reactions were noticed.



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*SPECIAL ARTICLES*

## SUGGESTIONS FOR INTERNATIONAL WORK ON HELMINTHOLOGY PROBLEMS


ACADEMICIAN K. SKRYABIN*


The scale of research conducted by various countries in diverse branches of helminthology is continually growing. It includes the study of new methods of diagnosis and problems of pathogenesis and immunology, elucidation of epidemiologic and epizootiologic problems referring to different climatic and geographic zones, development of preventive measures and testing of new anthelmintics for diverse forms of helminthiases, and wider measures of elimination.

The experience afforded by international congresses and conferences, held rather rarely, has shown that, though they provide facilities for getting acquainted with the theoretical problems studied in other countries and exchanging scientific opinion, they give the scientists of different countries little chance of co-ordinating their work.

The achievements of world helminthological science are either published in special magazines or reported at international congresses, conferences and symposia. Both practice and the international exchange of publications show that the standard of that scientific literature is far from high. Mediocre and even fallacious works are published together with works of high quality. The reason is that the correctness of the methods applied, and the scientific principles on which conclusions are founded are not checked by anybody.

With very few exceptions, no careful, serious scientific analysis of the works published is made by a really competent international organisation, capable of giving an unbiased opinion on the theoretical importance of these works, or choosing the best of them for practical uses and condemning all inadequate suggestions.

I believe that the channels I mentioned, through which the achievements of world science have a chance of reaching the scientists of different countries, are very inadequate for meeting the scientists' requirements.

The scope of problems dealt with by such international organisations as the Office International des Epizooties and FAO is too wide to permit their fixing any attention on individual problems of helminthology. Yet practice and the economic interests of diverse countries require the


* Received from Information Officer, U.S.S.R. Embassy in India, New Delhi.

working out of such complex methods against certain diseases as could be recommended for use in similar climatic and geographic zones, embracing the territories of several neighbouring countries.

I believe that the history of helminthology has reached a stage which requires theoretical and practical means to be worked out for the prevention of some forms of helminthiases. They might include the organisation of small groups of scientists from various countries, who would undertake to work out definite and immediate individual problems of helminthology.

It is not my intention to propose any organisational plan for the measure I am recommending. I am only raising this question to have it discussed in principle. I am not blind to the numerous difficulties that will stand in the way when it comes to applying the measures. I should only like to stress that the first thing is to work out individual, comparatively minor problems, that can be solved solely by the united effort of representatives from all the countries where the problems are most immediate and vital. It might be expedient first to draw a plan of practical scientific measures for the prevention of certain forms of helminth infection the elimination of which, I believe, is scientifically feasible.

Echinococcosis and coenurosis might be dealt with first, as a preliminary experiment, since the medical and preventive measures for these two forms of helminth infection are almost identical. To deal with theoretical problems, I think it would be advisable to combine work in helminth biochemistry and physiology with immunologic helminthology and send joint helminthologic expeditions to the zones where the local fauna has not been subjected to research.

The most important measures would be the organisation of commissions of representatives from various countries, for joint experimental tests of the comparative anthelmintic effects of different chemotherapeutic preparations used for the destruction of worms in men and animals.

It would also be advisable to organise collective work for the helminthologists of different countries, to study the influence of ionising radiation on the development and vitality of helminths at different stages of their ontogenesis. Another subject of collective work might be the use of tracer isotopes in various biochemical research.

These are my preliminary suggestions for a plan of this new work, which I believe to be promising. I suppose that the principles set forth here are applicable to other branches of parasitology, as well as to all branches of agricultural science.

# VENEREOLOGY DYING BUT NOT VENEREAL DISEASES*

R. V. RAJAM, M.S., F.R.C.P., F.R.S. (EDIN.)

*Madras.*

It would appear that specialisation in medicine is as old as civilisation. According to Herodotus, in ancient Egypt, each physician applied himself to the study and treatment of one disease only (Galdston, 1958). Down the ages, up to recent times, the lithotomist, the bone-setter, the lens-coucher, the fistula-mender, the pox doctor, the clap doctor, had plied their specialties. Although many of them were quacks, mountebanks and sharpers of every kind and variety, there were also men and women among them possessed of high skill, fine dexterity and of much practical wisdom. It is related that in ancient Egypt, one of the Pharaohs suffered from a urethral discharge. The urine specialist was called in and he gave a prescription in which, the urine of a wife faithful to her husband was one of the ingredients. The papyrus tells the story, how for 10 long years, the myrmidons of the Pharaoh searched and searched in the four corners of the Kingdom, and at last succeeded in getting a specimen of the urine from a faithful chaste wife, who on further examination turned out to be a virgin. This is a measure not only of the nature of therapeutics extant in those distant historical periods but also of the state of immorality and sex laxity prevalent. From the 15th to 18th centuries, venereal disease as a specialty was practised solely by quacks, bath attenders, among whom there was a significant number of itinerant female venereologists. The term 'quack' originated in the word *quecksilber*, the German for mercury, with which syphilis was originally treated. The educated physician of the Galenical School regarded the treatment of these diseases beneath their dignity. With the spread of syphilis in Europe the treatment of the disease was organised and regulated in all the merchant towns of Germany, France, Italy and England and for some unknown reason women specialists were preferred for appointment as they were considered superior and better skilled in the technique of administration of mercury in its various forms (Schonfeld, 1952).

It is a matter of historical record that during the great plague of London, the prostitutes were the only people who never left London and who

* Lecture delivered at the Indian Council of Medical Research Conference held at the M. G. M. College, Indore, November 1958.

were kept busy, because a rumour began to spread that the surest protection against plague was the acquisition of a venereal disease and the whore houses of London were open 24 hours a day. Harlots and customers often died together locked in a last embrace (Winsor, 1950).

For over 400 years before the penicillin era, and to take syphilis as the major disease in the venereal group, no other communicable disease of man had been such a fascinating field of study as syphilis, not only among physicians, pathologists and immunologists but also among poets, dramatists, social historians and social scientists. Dubos (1950), quoted by Moore (1951), writing about tuberculosis and syphilis, seems to imply that western civilisation took syphilis in its stride and learned to live with it. The widespread contagion may have made European culture burn with a brighter light if it be true as claimed by certain medical writers that a correlation exists between syphilis and genius. The fathers of modern medicine of the later half of the 18th and the whole of the 19th century had described, delineated, classified and comprehended the entire range of the clinical manifestations of syphilis and gonorrhoea with their unrivalled capacity for observation and record. During the first half of the present century it is common knowledge that the great discoveries in the aetiology, laboratory diagnosis, epidemiology and therapeutics of syphilis and gonorrhoea have been unequalled by that of any other infectious disease. The study of syphilis besides benefiting it has contributed to parallel advances in other fields of medicine. Chemotherapy started with a quest for the cure of syphilis and has now embraced the entire domain of infectious diseases. In the earlier decades of the present century and during the closing years of the last century, venereal diseases were mainly practised by general physicians, surgeons and dermatologists as part of clinical medicine and surgery. But with the realisation of the necessity of control of these diseases, by medical, public health, educational and social measures, the speciality of venereology was born about 40 years ago. Organisation of diagnostic and treatment centres, patient education, epidemiological investigation of contacts, serological screening of strategic groups of population, mitigation of social and economic factors are the several measures for the cure and control of these diseases. By the application of these principles and methods, the European and American nations have achieved a progressive decline in the incidence and prevalence of these diseases (Moore, 1951). Side by side with the control measures a considerable amount of research on the several facets of the V.D. problem were carried out by clinicians, microbiologists and epidemiologists.

The accelerated and precipitous decline in syphilis incidence among the population of Western Europe and America is a phenomenon of the postwar era. The advent of penicillin coupled with an intense educational campaign and the application of public health principles of preventive control has played the star role in the spectacular decline of the disease. It is established that penicillin is curative in early syphilis, preventive of prenatal syphilis, abortive during the incubation period of the disease, and prophylactic before exposure to infection. The widespread use of penicillin in these countries for a variety of non-syphilitic conditions from a common cold to every conceivable ailment has had a profound influence in aborting and preventing the potential syphilitic infections in the population. Such 'happenstance' treatment is credited as one of the factors in the reduction of early symptomatic syphilis. Another factor of importance in bringing penicillin by chance to the unrecognised syphilitic is gonorrhoea. The treatment for gonorrhoea which has not shown a significant decline in these countries may be a factor in lowering the syphilis attack rate, through administration of penicillin for gonorrhoea to a large number of persons of these socio-economic groups, of the population where syphilis most frequently occurs (Schamberg, 1956).

A plausible explanation is offered for the failure of gonorrhoea to decrease comparable to the decline of syphilis in America and other Western countries, to the shorter incubation period of gonorrhoea in men. If the incubation period of syphilis is taken as two months and that of gonorrhoea as 4 days and if it is assumed that the average person received one injection of penicillin per year, for a disease other than venereal, then the chance of receiving penicillin after infection and before diagnosis would be 1 in 6 in syphilis and 1 in 91 for gonorrhoea. It is therefore inferred that coincidental penicillin is more likely to abort an unrecognised and undiscovered syphilis than gonorrhoea (Schamberg, *loc. cit.*).

It would appear according to Moore (1956) that in the current antibiotic era, the venereologist finds himself in the unenviable position of having worked himself out of a job, in the youngest speciality barely 4 decades old. An unreal philosophy has crept into the minds of health administrators and doctors who are not in direct contact with the subject that these diseases are dying or will soon disappear and hence no longer constitute a danger to society or a challenge to medicine. The venereologist is dead, long live

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penicillin, the uncritical optimist says. Moore (1956) compares the venereologist with 'the fighter pilot whose aircraft has been shot from under him and who is parachuting slowly down to earth wondering what he will do when he lands. By a curious dichotomy he has been in the dual position of defender and attacker of his own aircraft and that he has shot himself down.' But are venereal diseases dying even in the advanced countries of the West. Voices are being heard on both sides of the Atlantic, that in spite of the steep downward trend in the reported incidence of these diseases, particularly syphilis, there has been no evidence of complete control or near prospect of eradication (Beerman, 1958). On the other hand, these tough and enduring enemies of mankind have been rearing their ugly heads in many urban areas of the United States of America since 1955, while in Great Britain it has been reported that with the exception of syphilis, the other venereal diseases seem to be increasing and in regard to even syphilis there has been an appreciable rise in certain urban and industrial areas which they seem to attribute to the arrival of large numbers of coloured immigrants from Africa and West Indies (King, 1958). There has been a sharp divergence of view between American and British venereologists on the future of venereology as a live speciality. The American view led by Moore, and based upon their impressive and outstanding achievements in the field of venereal diseases control stems from their excessive concentration on the problem of syphilis while the British with their innate conservations take a long range and broader view of the problem, are legitimately proud of the fact that the comprehensive speciality of venereology was largely a British institution, and hardly existed in other countries where it was usually partitioned between dermatologists, urologists and gynecologists. It is also good to remember that at no time in the history of medicine was a communicable disease such as syphilis or gonorrhoea which is dependent on human sexual behaviour and whose aetiological agents have no natural extra-human biological existence ever eradicated completely. While the advanced countries of the West have achieved a measurable decline in the reported incidence of venereal diseases through educational, epidemiological and therapeutic measures of control and are only debating about the status and the future of the venereologist it is apparent that complete control of venereal diseases not to speak of eradication, is not yet in sight and the eternal vigilance is the price for keeping and maintaining a low attack rate of these diseases.

Let us take a look at the picture in our country on this health problem. We have no country-wide organised facilities for the control of venereal diseases even in urban areas and hence no base line figures of the incidence and prevalence of these diseases are available. But the attendance of V.D. patients in the larger hospitals particularly of the teaching type, serological screening of specific groups of the population, such as expectant mothers, blood donors, give some idea of the venereal diseases situation with reference to syphilis. It is our estimate that 3 to 5 per cent of the urban population are positive reactors to syphilis. If hospital figures are any indication of the relative proportion of early to late and latent syphilis, it is found that 60 to 75 per cent of the syphilis load consists of primary and secondary infections which, from a public health point of view, is indicative of a considerable number of undiscovered infections in the population (Rajam, 1955). There is a significant quantum of late symptomatic syphilis in the form of benign tertiary syphilis, ocular syphilis, cardiovascular syphilis and central nervous system syphilis. In the state-sponsored enquiry on ocular syphilis, a routine serological examination of patients with eye trouble showed 15 per cent positive reactors to syphilis. Of these, one fifth showed involvement of the optic nerve and half of them were cases of optic atrophy due to syphilis. One fifth of the younger age groups with a positive serology have been suffering from interstitial keratitis. In an I.C.M.R.-sponsered enquiry about the role of syphilis in mental disorders which we got going since May of this year, 14 proved cases of dementia paralytica and 1 case of psychosis due to meningovascular syphilis were uncovered in the routine unselected screening of 278 patients who sought admission in the Mental Hospital at Madras. The oft quoted and repeated opinion that general paresis of the insane is very rare in the tropics is not borne out even from this limited enquiry.

Regarding the incidence of gonorrhoea, it is anybody's guess. The hospital figures are quite fallacious and lower than those for syphilis. As it is an infection so quickly acquired and so rapidly cured, it is our impression that an unknown but considerable percentage of patients with the disease do not reach hospitals but seek treatment in the private sector both of the qualified and unqualified variety. But the dreaded complications of gonococcal infections are things of the past and there has been a progressive fall during the past 20 years with an abrupt linear decline in 1956 and 1957 in the incidence of these complications. The peak figure for complications was 385 patients in 1940 which has dwindled to 28 patients in 1957 as

gathered from the records of the Institute at Madras.

Organised facilities for the diagnosis and treatment of venereal diseases exist only in some of the teaching hospitals. Even in these institutions, the approach is mostly clinical and therapeutic. No attempt is made at the epidemiological investigations of contacts and to bring them under treatment. As part of the health programme of the second Five Year Plan, the Central Government have put forward a very modest and rather anaemic looking scheme for the national control of these diseases, but I understand only some of the States have accepted the scheme. Three years of the second plan period have come and gone and no information is available on the progress made in the implementation of the scheme. We have yet to achieve even a partial control of these diseases like the Western Nations. What with the shift of populations from the rural to urban areas, the increased tempo of industrialisation envisaged in the national plans, the mounting population increase, we should expect a high attack rate of venereal diseases which could only be brought down to a low level of infectiousness by organised control measures. Carried away by the slogan of dying venereal diseases raised in the West, a complacent apathetic attitude seems to have invaded the minds of the professional and lay public in our country. Doctors are no longer interested on the subject of venereal diseases and do not come forward to get trained in the speciality. Even in the best of times, the practice of venereal diseases has lacked the social prestige of other specialities and now even the monetary rewards have almost disappeared. There is evidence that the practice of venereal diseases because of the extreme simplicity of the therapeutics, is passing into the hands of the quacks who go about armed with a syringe and vial of penicillin, a state of affairs reminiscent of quacks and women venereologists of the 16th and 17th centuries in Europe. A species of wishful thinking seems to prevail in the minds of the medical profession in our country that the control and mitigation of this group of diseases will be automatic, with the easy availability and widespread use of penicillin. Why all the expensive paraphernalia of clinics, laboratories, case finding and case holding procedures?

In the history of medicine, it has often been observed that the intellectual and scientific curiosity in any disease process diminishes or vanishes, as soon as a cure has been found. To the curious biologically minded clinician, there are still fundamental and fascinating unsolved riddles in these group of diseases. A virulent *Treponema pallidum* has never been grown on artificial media. Stemming from this, a vaccine for mass immunisation is yet to be discovered. On the clinical side, why is aortitis, sharply delimited to the thoracic aorta only. How do sex, race, geography, climate modify the course of the disease? An organism morphologically indistinguishable, causes yaws in the back woods of Madhya Pradesh, pinta in Mexico, endemic syphilis in the slums of Madras city, and venereal sporadic syphilis among the adults of either sex in cities, seaports and pilgrim centres. Is there any factor other than syphilis which is responsible for the unique syndrome of tabes dorsalis or gastric crisis? Why is the female of the human species deemed to be a symptomless carrier of gonococci?

From an immunological point of view, will a prolonged low attack rate of syphilis in the population with a large number of non-immune persons actually increase the danger of future epidemics as happened in Norway during World War II. With the decreasing incidence of syphilis and increasing refinements in the serological diagnosis the clinician is confronted with the problem of biologically false positive reaction, its incidence, aetiological background and management. The recent recognition that such false reactions, if chronic and persistent in the absence of syphilis, are not mere technical errors of the laboratory but indicative of underlying serious collagen disorders, have been engaging the attention of syphilologists and internists (Moore, 1956). The treponema immobilisation test for syphilis with its various modifications, has been of signal help to the clinicians in separating the true positive sheep from the false positive goats. Certain other facts and speculative fancies have emerged in the recent past after the advent of penicillin in the therapy of syphilis and gonorrhoea. Side by side with the reduction in the over-all attack rate of syphilis in the population after the advent of penicillin, there has been an increase in reinfections and/or relapses varying from 5 to 10 per cent, both symptomatic and asymptomatic. For thousand of years, the trepondema has been living in a rather unfriendly symbiosis with the human host, but now with penicillin therapy there appears to be a change in the host-parasite relationship. The virulent invasive powers of the treponema seem to have suffered a setback as witnessed in the low incidence of asymptomatic neuraxis involvement in untreated early syphilis ; a mere 2 to 4 per cent of abnormality in the CSF in contrast to the 25-40 per cent in the pre-penicillin days. The French workers (Levaditti and Vaisman, quoted by Beerman *et al*, 1953) have brought forward some unconfirmed evidence from the study of syphilis in experimental animals that penicillin

may ultimately dethrone syphilis from its systemic status to one of purely local lymphatic involvement provided the organism does not develop resistance to penicillin in the succeeding years.

While early symptomatic infectious syphilis is declining in most countries the incidence of latent syphilis shows an absolute or relative upward trend. In USA, for instance, the ratio of early symptomatic to latent syphilis cases was 3 : 1 in 1947. In 1954 it was 1 : 3 (Appropriation Committee of Federal Congress, 1954). The corresponding figures for the Institute of Venereology at Madras are 4 : 1 in 1953 and 1 : 1 in 1957. A sixfold increase in the incidence of latent syphilis among the Armed Forces personnel within 8 years from 1947 to 1954 has been reported by Banerjee and Narain (1956). Is it a case of syphilis going underground beneath the threshhold of clinical recognition only accidentally discovered on routine serological test. Time and further observations alone can tell. Two to three decades must elapse before one can assess the value of penicillin in early syphilis in the prevention of late syphilis.

The rising incidence of non-gonococcal urethritis with only a moderate fall in gonococcal infection is another new phenomenon of the current antibiotic era on which the British and Continental venereologists have been laying great emphasis. The aetiology is still unknown. Attempts to incriminate a virus have not so far succeeded. Various bacterial pathogens have been isolated but their aetiological roles have not been established. Its venereal aetiology is not confirmed by controlled epidemiological investigations. Fungal and protozoal agents account for a certain percentage of cases. But the type of abacterial urethritis is stated to be a major problem in European and British practice. The clinical manifestations are fairly easily recognised in the male but not in the female. The syndrome of Reiter's disease, comprising chronic prostatitis, relapsing arthritis, recurrent conjunctivitis and iritis with occasional occurrence of cutaneous lesions are stated to arise from an initial abacterial urethritis, either active or asymptomatic. Antibiotics produce temporary improvement but no permanent cure. A considerable literature has sprung up in recent years ; the relation between the socalled non-specific infection and the various manifestations of Reiters syndrome merits intensive investigation (King, 1958).

There is some evidence that with the decline of syphilis and gonorrhoea virus infections such as herpes progenitalis (Rajam *et al*, 1957) and protozoal infections such as trichomoniasis are increasingly recognised in VD clinics and the question of their venereal aetiology is being seriously debated and investigated.

It is also being increasingly recognised that antibiotic and chemotherapeutic control of bacterial and treponemal diseases with a tendency to their indiscriminate use in creating an imbalance in the competitive life of the pathogenic and saprophytic microorganisms in the human tissues, with the result that viruses at one end of the biological scale and the fungi at the other end released from the competitive coexistence of the larger bacteria may assume new and dangerous pathogenic roles afflicting human populations. A change in the pattern of old diseases and the appearance of new diseases syndromes have been a feature in the current antibiotic era. Bacterial resistance and bacterial dependence are looming ahead to confound the physician and the microbiologist.

So far there has been no evidence of development of treponemal resistance to penicillin. But the British workers have recently brought forward evidence of a decreasing *in vitro* sensitivity of the gonococcus to penicillin and a significant increase in the number of penicillin-resistant neisserian infections. At the Institute of Venereology, Madras, we have not encountered any such resistant cases of gonococcal urethritis so far and it is proposed to conduct an enquiry on the *in vitro* sensitivity of the strains of gonococci isolated from our cases.

The common pathogen, the staphylococcus, was extremely susceptible to penicillin in the earlier years of the advent of the antibiotic. But now it would appear from an increasing volume of reports appearing in foreign journals, that the organism has developed great resistance to the drug, particularly strains isolated from hospitals and are showing resistance to the other antibiotics as well. In the laboratory of the Institute of Venereology 8 resistant strains of *Staphylococcus aureus* have been isolated from patients who were treated for syphilis and in the course of treatment or following it, developed osteomyelitis, severe phlegmonous type of pharyngitis and enteritis, from all of which a pure strain of penicillin-resistant staphylococcus was isolated. Staphylococcus has been rightly dubbed as the modern hospital plague.

The last but by no means the least of the reactions to penicillin therapy are the sensitivity reactions. Among the antibiotics, penicillin has become the most potent sensitiser because of the larger number of persons who have been exposed to it. The pattern of sensitisation has been changing during the past 15 years from evanescent urticaria and serum sickness type of reaction to the most dangerous unpredictable type of anaphylactic shock, which may end fatally in 10 to 15 minutes. Those countries where penicillin has been in widespread use and for the longest period have record-

ed the highest number of serious and fatal reactions. As one interested in the subject, I prepared a questionnaire and sent it to I.C.M.R. with a request that it may be circularised to the teaching hospitals and the medical administrators of our country with a view to collect data on the incidence of these reactions. I am sorry to say that I have not heard anything about the subject. It is being reported from the West, that even the air they breathe in hospitals and the milk they drink from penicillin-fed cows, have become potent sensitisers.

From what I have tried to convey to you in this discursive lecture, you may concede that these social diseases are certainly not dying in our country. They are as much of a medical and public health problem as tuberculosis or leprosy. They lack publicity as to their importance to the health of our people. We have yet to tackle the problem in the manner of other advanced countries in the West. Even the very modest scheme of the 2nd plan period has been meeting heavy weather. Our I. P.'s., V.I.P.'s., who go about the country presiding and inaugurating medical and health conferences and exhibitions, rarely commit the mistake of mentioning venereal diseases as a health problem. Others take the cue from them. The interest, whether professional or academic among the new entrants to the profession of medicine has reached an all time low to use the expressive American phraseology, while the practice is passing on to the lesser breeds outside the profession. As a fully fledged speciality, I am afraid it is dying or dead even before it is fully born in our country. There are very few venereologists of standing in our country inspite of the growing number of medical colleges. Even for them the attractiveness of the speciality has gone. Some of them have managed to leave while the going is good like rodents from a sinking ship, others have become dermato-venereologists, a few have taken to sexology to keep the pot boiling believing in the dictum that the practice of prostatic massage fills the breach between sex hygiene and social hygiene. The centre at Johns Hopkins has taken to the study of chronic diseases stemming from their observation on the biologically false reaction. I understand that in the newer medical colleges and teaching hospitals, a prudent step has been taken to set up dermatology and venereology as a combined discipline as existing in the Continental countries of Europe and America. It is hoped, it will attract doctors of substance and quality to make the combined speciality their life's career.

There is so much talk of preventive and social medicine. Chairs have been established in many of the medical colleges. To the professor of preventive and social medicine, the subject of venereal diseases will offer unlimited opportunities for the inculcation of the principles and practice to the undergraduates and postgraduates. The venereal diseases specialist may become an extinct species. In the vacuum created, the dermatologist, the physician and the public health worker have to step in and assume responsibility for the cure and control of these diseases. To the private physician, I would say this—avoid promiscuous therapeutics. The practice of treatment before diagnosis is unpardonable in a scientifically educated physician. The adequacy of medical care should not be conditioned by the patient's capacity to pay.

To the undergraduates, I would repeat the saying of that great scholar physician Osler, 'knowledge ye syphilis and all things clinical will be added unto you.' To the microbiologist—by all means hunt for the viruses to keep up with the Joneses, but remember the sinister spirochaete. You may still achieve a Nobel prize, for the successful cultivation of a virulent treponema pallidum and a vaccine for the mass immunisation against this ancient scourge of Homo sapiens.

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*CASE NOTE*

# ACUTE MONOCYTIC LEUKAEMIA

S. N. SEN, M.B., M.R.C.P.

*Professor of Medicine*

AND

G. L. DAS, M.B.B.S.

*Senior House Physician*
*Medical College, Calcutta*

## INTRODUCTION

Monocytic leukaemia though rare, is being reported not infrequently. Originally described by Seschad and Schilling-Torgau in 1913 and for long thought to be a variety of myeloid leukaemia monocytic leukaemia has now been proved to be a distinct clinical entity having definite characteristics and typical haematological picture. According to the report of the department of haematology, School of Tropical Medicine, Calcutta, the incidence of monocytic leukaemia is as high as 15 per cent of all leukaemias investigated. To our knowledge, only 7 proved cases of monocytic leukaemia have so far been reported in literature from India (Napier *et al*, 1943; SenGupta and Ghosh, 1957; Ganguli, 1957).

The following case report may prove to be of interest.

## CASE REPORT

A. S., a Christian male, aged 28 years, was admitted in the Medical College Hospital on 23-10-57 with the following symptoms:

(i) Fever for 12 days and

(ii) Salivation and difficulty in deglutition for 9 days.

The onset was sudden with rise of temperature (101°F). There was no chill or rigor but it was associated with vomiting which was at first bilious but on the eighth occasion coffee-ground material came out and he felt very weak. The vomiting then subsided with treatment but a low range temperature continued (99°F to 100°F). In the course of three days he developed sore throat with salivation and difficulty in deglutition. He had an (?) influenzal attack (duration 4 days) 3 months ago and had been suffering from weakness and lassitude for the last 2 months.

*On examination* the patient was a young adult of average build and nutrition. His weight was 120 lb. He was pale. There were no petechial haemorrhage in the skin. The submandibular group of lymphnodes was enlarged on both sides and these were slightly tender. The pulse was 98 per minute. The temperature was 99°F. The blood pressure was 108/70 mm. of Hg. The gums were slightly swollen and bled on pressure. The mucous membrane of the mouth was healthy but both the tonsils were congested and enlarged and there were dirty white sloughs extending to both the tonsils. The liver was just palpable but not tender. The spleen was palpable 1 finger below the costal margin. It was smooth and firm but not tender. There was bony tenderness over the sternum and tibia. Other systems revealed nothing abnormal.

INVESTIGATIONS:

Hb.—11·02 g. per cent;

R.B.C.—2·9 mill./c.mm., reticulocytes—0·1 per cent, P.C.V.—33 per cent, M.C.V.—87 cμ, M.C.H.—38 γγ, M.C.H.C.—33 per cent, platelets —17,400/c.mm.

W.B.C.—57,500/c.mm. with polymorph 1 per cent, lymphocytes 5 per cent, monocytes 12 per cent, premonocytes 3 per cent, monoblasts 74 per cent, eosinophils 2 per cent and basophils 3 per cent.

Bleeding time—5 minutes; coagulation time—4 minutes 15 sec.

Mean E.S.R.—70 mm. per hour.

Bone marrow biopsy: Marrow—hypercellular; reticulum cells—plus; erythropoiesis—greatly reduced, normoblastic, mostly 'C'; granulopoiesis —greatly decreased; large number of monoblasts, premonocytes and monocytes predominate the myelogram; megakaryocytes—decreased, mostly inactive.

Urine: Albumin—trace, Bence Jones protein—trace, hyaline casts plus, R.B.C.—occasional.

Blood biochemistry: Blood urea—30 mg./100 c.c.; uric acid—5·2 mg./100 c.c., cholesterol —170 mg./100 c.c., proteins—7·8 g. per cent with albumin 4·8 g. per cent and globulin 3·0 g. per cent.

Van den Bergh's test—indirect positive; bilirubin content 0·4 mg./100 c.c., icterus index—4; serum alkaline phosphatase—1·8 (Bodansky units).

Skiagram—X-ray of the bones and joints of the extremities and chest normal.

Ophthalmoscopic examination—Fundus oculi normal.

Fractional test meal—Normal curve (with maximum acidity =46 c.c. N/10 HCl).

Throat swab—Nothing significant.

TABLE 1—SHOWING TREATMENT DONE AND THE PROGRESS OF THE DISEASE

| Date | Treatment done | Blood picture | | | | | | | | | | | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Hb. in g. per cent | R.B.C. in mill./c.mm. | W.B.C. in thousands/c.mm. | Platelets in thousands/c.mm. | Polymorphs per cent | Lymphocytes per cent | Monocytes per cent | Eosinophils per cent | Basophils per cent | Monoblasts per cent | Premonocytes per cent | |
| 26-10-58* | — | 11·02 | 2·9 | 57,500 | 17,400 | 1 | 5 | 12 | 2 | 3 | 74 | 3 | Condition fair, salivation controlled |
| 1-11-58 | 560 c.c. of blood transfusion | — | — | — | — | — | — | — | — | — | — | — | Pallor marked |
| 3-11-58 | Purinethol started | 12·01 | 3·1 | 57,600 | 24,000 | 2 | 5 | 12 | 1 | 1 | 75 | 3 | — |
| 7-11-58 | — | 11·9 | 3·0 | 46,000 | 21,300 | 5 | 9 | 19 | 1 | 0 | 66 | 1 | — |
| 11-11-58 | Purinethol stopped (for lack of supply) | 12·5 | 3·41 | 34,400 | 21,000 | 7 | 12 | 22 | 2 | 0 | 52 | 4 | General condition fair |
| 16-11-58 | — | 7·9 | 2·21 | 33,000 | 17,000 | 7 | 12 | 22 | 2 | 1 | 51 | 4 | Patient passed tarry stools |
| 20-11-58 | Purinethol started again | 6·2 | 2·1 | 33,000 | 17,200 | 6 | 12 | 22 | 3 | 2 | 52 | 3 | — |
| 21-11-58 | 560 c.c. of blood transfusion | — | — | — | — | — | — | — | — | — | — | — | — |
| 25-11-58 | — | 5·1 | 1·9 | 24,000 | 14,000 | 8 | 12 | 29 | 1 | 0 | 47 | 3 | — |
| 27-11-58 | 280 c.c. of blood transfusion | 4·1 | 1·1 | 18,000 | 12,000 | 8 | 13 | 29 | 1 | 0 | 46 | 3 | — |
| 30-11-58 | Purinethol omitted; Delta Cortril 1 tablet 6-hourly | 4·0 | 1·02 | 20,000 | 7,400 | 10 | 15 | 31 | 1 | 0 | 40 | 2 | Patient drowsy. No further clinical improvement |
| 1-12-58 | 280 c.c. of blood transfusion | — | — | — | — | — | — | — | — | — | — | — | — |
| 3-12-58 | 280 c.c. of blood transfusion started when the temperature was controlled | 3·0 | 0·92 | 17,800 | 7,400 | 10 | 15 | 31 | 2 | 0 | 38 | 3 | General condition very low. Patient delirious, temperature 105° F., B.P. 100/60 mm. of Hg |
| 4-12-58 | — | — | — | — | — | — | — | — | — | — | — | — | Patient comatose. Pulse imperceptible, extremities cold. Expired |

* Done in School of Tropical Medicine (and the case was sent as chronic lymphatic luakaemia.

TREATMENT :

As soon as the case was proved to be one of acute monocytic leukaemia, a trial was given of 6-mercaptopurine and a series of blood counts was done to check up the results. For 8 days (3-11-57 to 10-11-57) 3 tablets of purinethol were given daily. Then unfortunately the drug had to be stopped temporarily because of nonavailability. From 20-11-57 to 30-11-57 purinethol was given continuously. As there was a marked fall of platelet count and deterioration of the general condition the drug had to be stopped. Besides 6-mercaptopurine the patient got adequate transfusion of blood and also cortical hormone when the platelet count became very low.

The general condition of the patient deteriorated gradually at first and then rapidly. It could not be checked by blood transfusion and cortical hormones.

The patient expired on 4-12-58.

Details of treatment and follow-up blood picture are shown in Table 1.

## Discussion

6-mercaptopurine belongs to the cytotoxic group of drugs. It exerts its effect by interfering with the synthesis of nucleic acids (particularly DNA) and thus renders the cells non-proliferative. The usual dosage is 2·5 mg/kg. body weight daily administered by mouth in divided doses. The drug is available under the proprietary name purinethol in tablet form each containing 50 mg. The antileukaemic effect of 6-mercaptopurine usually does not become manifest until after 3 to 8 weeks of continuous therapy, although occasionally it acts more rapidly.

6-mercaptopurine has been given extensive trial with good results in some of the cases.

The therapeutic activity of this compound has been evaluated by the Chemotherapy Service, Memorial Centre for Cancer and Allied Diseases, Division of Experimental Chemotherapy, Sloan-Kettering Institute, New York, in 209 cases of neoplastic diseases of whom 140 had acute leukaemia (Burchenal *et al*, 1954).

Of these 87 were children amongst whom 41 had good clinical and haematological remission, 16 partial remission and 30 were considered failures. In 50 adults the results were not so satisfactory; 7 cases had good clinical and haematological remission, 10 good clinical but only partial haematological remission and 33 failures.

6-mercaptopurine and cortical hormones were used simultaneously in the treatment of 5 adult males with acute leukaemia, age 10-46 years (Moynihan and Berman, 1956). Four of them showed complete clinical remissions. The remissions appeared to be more sustained than would be expected, had each drug been employed alone.

That the survival rate is increased by the use of modern drugs is evident from the report quoted by Burchenal *et al* (1954) (Table 2).

Table 2—Showing Results of Sequential Therapy of Acute Leukaemia in Children

| | No. of patients | Surviving 1 year or longer | |
|---|---|---|---|
| No treatment ... | 218 | 5% | Collected from the literature (Tivey, 1952) |
| Cortisone and amethopterin ... | 154 | 29% | Treated in Memorial Hospital |
| Amethopterin, cortisone and 6-mercaptopurine ... | 52 | 52% | |

In the case under review response, haematological and clinical, was unsatisfactory.

6-mercaptopurine is a new drug and it is now too early to assess its value in leukaemia. Though there are temporary remissions, both haematological and clinical, in some of the cases, there is relapse in every case sooner or later even with maintenance dose of the drug It is definite that the drug has increased the survival time in leukaemic cases.

## Summary

A case of acute monocytic leukaemia is reported. The patient was treated with 6-mercaptopurine.

## Acknowledgment

We are grateful to Dr. S. C. Bose, Principal and Superintendent, Medical College Hospital, Calcutta, for his kind permission to publish this article. Our thanks are due to Dr. J. B. Chatterjea, Professor of Haematology, School of Tropical Medicine Calcutta, for help in confirming the diagnosis.

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## DIAGNOSIS AND LOCALISATION OF INTRACRANIAL TUMOURS

Diagnosis and localisation of intracranial tumours have become essential as modern surgery has ensured safe removal of many of these tumours with remarkable benefit to the patient. The great neurologists—Hughlings, Jackson, Charcot and others—made careful clinical observations of diseased patients and were able to ascribe the functions to various parts of the brain. Experimental work on the mammalian brain by workers like Sir Charles Sherrington confirmed these observations. With increasing knowledge of the functions of the brain, it has now been possible to understand its disorders and thus arrive at a diagnosis of the area of the brain involved.

Intracranial tumours in medical parlance include all space-occupying lesions inside the cranial cavity. These include neoplasms, abscesses, haematomas, granulomas, parasitic infestations, etc. They have the common feature of increasing intracranial tension and causing focal damage to certain areas of the brain. Headache, vomiting and dimness of vision constitute the symptomatology of increased intracranial tension. However, these symptoms may not be present in all the cases. Headache in intracranial tumours is present in about 75 per cent of cases and is characteristically increased by any strain, coughing or sneezing. The headache is worse in the mornings than in the evenings. The vomiting is often not accompanied by nausea. Papilloedema may be the most important single sign in the diagnosis of intracranial tumours. Headache and vomiting may appear in a later stage of the tumour while papilloedema may be the earliest sign of the above triad. Papilloedema can be easily detected by the use of the ophthalmoscope. Unfortunately the use of this very valuable instrument is still not widespread amongst the general practitioners in our country and as a result cases are too often missed or diagnosed late. It is essential that all medical men and women make routine use of this simple instrument to save countless tragedies.

Before a general rise in the intracranial pressure occurs the tumour, by interfering with the function of the local areas of the brain, may cause some focal neurological disorder. Any slowly progressive loss of function should make one think of a tumour. Progressive weakness of the limbs, difficulty in speech, diminution of hearing, diminution of vision or gradual loss of any other function of the body means that there is a progressive focal lesion. Sometimes before the function is lost, it is likely to be preceded by an irritative phase as happens in focal fits. Thus a careful neurological examination is helpful in diagnosis and localisation of intracranial tumours and it is often the mainstay of the diagnosis.

In some cases it may not be possible to localise an intracranial lesion by clinical examination alone. Many modern aids to diagnosis have been evolved, which when employed contribute to the accurate localisation of the lesion.

Direct introduction of air into the ventricles, known as ventriculography, has been one of such useful procedures. Air or oxygen can also be introduced into the ventricles and the subarachnoid space by the lumbar route and the procedure is known as pneumoencophalography. As lumbar puncture is contraindicated in high intracranial tension due to its risk of sudden death due to pressure coning pneumoencephalography is not performed in cases of increased tension except in a few centres where it is becoming more common in expert hands. By change in the shape, size and position of the ventricular system, a localisation of the tumour can be made. Air studies in cases of increased tension often alter the hydrodynamic equilibrium of the brain and fatal accidents may occur by pressure coming either at the foramen magnum or at the tentorium. Hence it is necessary to be prepared for immediate surgery after air studies.

The technique of visualisation of the cerebral arteries by a radio-opaque dye has been introduced. Percutaneous carotid angiography is now a common procedure in neurosurgical centres. Vertebral angiography helps to visualise the lesions in the posterior fossa. Angiograms can be taken either by the use of hand-operated cassettes or by utilising automatic serial changers where the time interval can be adjusted according to the needs. For most of the ordinary purposes of diagnosis a hand-operated cassette is useful and inexpensive. Angiography is helpful in not only localising the anatomical site of the lesion but also often in diagnosing the pathological nature of the condition. It is safer than ventriculography in supratentorial lesions. Angiography has also been

helpful in the diagnosis of intracranial vascular lesions.

Electro-encephalogram is another diagnostic aid in which a study is made of the electrical activity of the cells of the brain by fixing electrodes to the scalp and recording the same in an electro-encephalograph. By studying the changes in brain waves that occur in disease processes, it has been possible to diagnose and localise intracranial lesions successfully in a large percentage of cases. But the limitations of electroencephalogram should also be recognised. It is not often useful in deep-seated lesions or lesions in the posterior fossa. It could be also misleading in the presence of very high intracranial pressure. By the use of special electrodes like pharyngeal and sphenoidal electrodes in selected cases more accurate localisation is possible.

The introduction of positive contrast studies has been an advance in diagnosis. By introducing 2 cc. of pantopaque into the ventricular system and observing the passage of the dye along the various ventricles one can get an idea of the location of the tumour. Compared to air-ventriculography, this procedure is less risky and immediate surgery is not always necessary. The procedure is considered very useful in midline and posterior fossa tumours.

Ultrasonic waves and radio-isotopes have also been used in diagnosis and localisation of intracranial tumours.

Many conditions, in which the intracranial pressure rises, may simulate an intracranial tumour. Toxic conditions, specially lead encephalopathy, may closely simulate intracranial tumour. Headache, dimness of vision and fits occurring in lead poisoning may very closely resemble the symptoms of a tumour. Hypertension and albuminuria, cause headache and oedema of the optic discs and thus simulate tumours. Intracranial venous thrombosis leads to cerebral oedema and a rise of intracranial pressure and thus gives rise to symptoms of an intracranial tumour. Cysticercosis is a common intracranial complication in some parts of our country. The cysts will increase the tension either by their very bulk or by obstructing the intracranial pathways.

By studying in detail the history and by a careful neurological examination and in necessary cases by the use of the suitable ancillary methods of diagnosis, it is possible to diagnose and localise intracranial lesions in a vast majority of cases. The most important single factor in the prognosis of intracranial tumours is early diagnosis. With early and accurate diagnosis, modern neurosurgery has become as safe as surgery elsewhere in the body.



## SHOPS & ESTABLISHMENT ACT AND DOCTORS

The Delhi Shops and Establishment Act which was enforced in Delhi in 1954 was made applicable to the doctors' clinics in Delhi. But on representation by the Delhi State Branch of the Indian Medical Association, the Delhi State Cabinet granted full exemption to the clinics from the applicability of the Act. In December 1957, however, without assigning any fresh reason and without referring it to the medical profession of Delhi, the Act was enforced on the doctors' clinics by a notification.

There have been similar enactments by other State Governments and in some cases, the doctors' clinics have not been excluded from the purview of the Act.

But, is the doctors' clinic a trade shop? The ordinary shops are dealers of commodities of common use, sold to the general public. But the doctors' clinic is a "miniature hospital" where, only medical aid is given to the ailing people by qualified medical men. So by any stretch of imagination it cannot be placed in the same category with the general shops. If it is done, it will restrict the existing scope of medical aid available at the clinics and the public will be deprived of the facilities of having treatment by doctors of their own choice at any time it is necessary, instead of going to any hospital.

By enforcing this Act on the doctors' clinic, the Delhi State Government and other State Governments have ignored the importance of the clinic and the valuable services it renders to the ailing people. Such an Act, we believe, will also hamper the proper discharge of the professional duties of the doctors to the public and put them to serious difficulties, if they have to comply with the provisions of the Act. This question, therefore, involves the medical profession not only of Delhi but of India as a whole.

The Indian Medical Association has lodged a strong protest against the imposition of such an Act and we hope good sense will prevail upon the State Governments, and the doctors' clinics will be exempted from the purview of this Act.

# CURRENT MEDICAL LITERATURE

## The Changing Pattern of Acute Leukaemia

BOCK, H. L. (*German M. Monthly*, **4** : 150, 1959) from the Department of Medicine, University of Marburg, in giving a retrospect of 10 years' experience on the changing pattern of acute leukaemia, basing on a review of 185 cases of acute leukaemia, seen at the University Clinics of Marburg and Tubingen between 1920 and 1958 observes that the disease has shown a progressive increase in incidence. Compared with the average during 1920-1935, the number of cases had doubled between 1936-1945 and quadrupled between 1946-1955, an increase which was particularly marked in adult age-groups. The incidence of acute leukaemia now equals that of the chronic forms, and ever more of the cases occur among those aged between 35 and 65 years.

There has also been a change in the clinical findings : previously rare signs and symptoms are seen more often, and more of the signs and symptoms are caused by anti-leukaemic treatment.

Fever, sweats, influenza-like illnesses, weakness and loss of weight—all attributable to leukaemia—have become commoner, and, as the more dramatic features of the acute phase have come under control, they more often constitute the patient's only complaint. Skin and mucosal lesions increased in the period 1945-55, when chemotherapy and antibiotics, but not corticosteroids, were in general use. Anaemia, abdominal pain and epistaxis have accompanied the increased use of corticosteroids since 1956; thromboembolic episodes have also become commoner.

But there is no evidence of a true change in the pathology of the acute leukaemias.

There has been a marked increase in the mean survival time since the introduction of antibiotics, antimetabolites and adrenal steroids. It has been found that the serum $\alpha_2$-globulins reflect the acuteness of the disease; they fall during remissions and rise during exacerbations. Enzymatic studies of carbohydrate metabolism of leukocytes showed that in acute leukaemia glycerophosphate dehydrogenase is practically completely absent, while the concentration of glucose-6-phosphate dehydrogenase is markedly diminished, as is that of phospho-glyceraldehyde dehydrogenase.

## Hepatosplenomegaly in Cardiac Affections

DATEY, K. K. AND SARDESAI, H. V. (*J. A. Physicians of India*, **7** : 297, 1959) from G. S. Medical College and K. E. M. Hospital, Bombay, give in the following lines the summary of their observations :

Various aetiological factors leading to hepatosplenomegaly in cardiac affections, are presented.

Ordinarily, in adults, the spleen of 300 g. or over is in the palpable range. Splenomegaly in the palpable range, even when present in cases of congestive cardiac failure, may be difficult to detect clinically because of the following factors :

(a) Acute condition of the patient.

(b) Oedema of anterior abdominal wall and ascites.

(c) Poor movement of the diaphragm.

It is extremely rare to get a clinically palpable spleen in cases of uncomplicated congestive cardiac failure.

Incidence of hepatosplenomegaly is high in cases of constrictive pericarditis when it may be palpable in 50-70 per cent of the cases and in bacterial endocarditis with congestive cardiac failure, spleen is enlarged in over 90 per cent of the cases.

Liver and spleen are enlarged in cases of systemic diseases which may also affect the heart, viz., endocrine, metabolic and collagen diseases and in blood diseases like anaemias, leukaemias and polycythaemias.

## Less Recognised Action of Atropine on Cardiac Rhythm

AVERILL, K. H. AND LAMB, L. E. (*Am. J. M. Sc.*, **237** : 301, 1959) from the Internal Medicine School Aviation Medicine USAF Air University, Randolph AFD, Texas, give in the following the summary of their observation on the less commonly recognised atropine on cardiac rhythm :

It has been shown that atropine may induce ectopic foci to assume the role of cardiac pacemaker, but in the experience of the authors no ventricular focus was seen to develop in a large number of patients. However, if the vagotonic influences on the supraventricular areas is intense enough (as after neostigmine) the early release of a ventricular focus from vagal control by the atropine may precipitate transient idioventricular rhythms.

Atropine sulphate is a potent cardiac parasympatholytic blocking agent.

There are three distinct phases of atropine action on the heart. These include an initial vagotonic effect, a transient period of vagal imbalance at different levels of the conduction system, and a final prolonged period of parasympathetic blockage.

The changes seen during the early action of atropine are similar to those seen when vagal imbalance is produced by various simple respiratory procedures.

Use may be made of this early action of atropine in the investigation of certain arrhythmias and conduction defects.

Although the cardiac actions of atropine in the usual clinical doses are benign, when combined with actions of drugs, such as neostigmine, serious arrhythmias and conduction defects may occur.

## Reversal of the Cardiotoxic Effects of Quinidine by Molar Sodium Lactate

BELLET, S., HAMDAN, G., SOMLYO, A. AND LARA, R. (*Am. J. M. Sc.*, **237** : 105, 1959) from the Division of Cardiology, Philadelphia General Hospital and Robinette Foundation of the University of Pennsylvania, Philadelphia, Pennsylvania, give in the following lines the summary of their observations on the effect of molar sodium lactate in procaine-amide toxicity :

The therapeutic effect of molar sodium lactate during procaine amide toxicity was studied in two groups of dogs : Group 1 in which continuous procaine amide infusion was given until death of the animal; Group 2 prepared in a manner similar to Group 1 in which the

effects of molar sodium lactate were studied at various stages of procaine amide toxicity.

The electrocardiographic abnormalities and the hypotension which resulted from procaine amide toxicity were consistently and markedly improved by the use of molar sodium lactate.

Molar sodium lactate was effective in reversing the cardiotoxic effects of procaine amide toxicity at a more advanced stage than that observed with quinidine.

Infusion of procaine amide (in addition to its increased concentration in the blood) results in profound electrolyte changes consisting of the production of acidosis as manifested by a decreased pH and $CO_2$; in addition there was decrease in potassium, calcium and magnesium.

The beneficial effects of molar sodium lactate in procaine amide toxicity are suggested to result from a combination of the following factors : (a) decrease in the plasma procaine amide levels, (b) improvement of the acidosis, (c) decrease in serum potassium and (d) the effect of lactate as a metabolic fuel.

### Isopropyl-noradrenaline in Cardiac Irregularities

FRIESSE, G. (*München. med. Wchnschr.*, **100** : 306, 1958, Ref. *German M. Monthly*, **4** : 102, 1959) of Mediz. Univ.-Klinik, Heidelberg, writes :

The bronchodilator isopropyl-noradrenaline (Aleudrin, Isuprel) is useful in the treatment of cardiac arrhythmias. The drug was given to 26 patients with partial or complete heart block, sinus bradycardia, and interference-dissociation : many of them had frequent Stokes-Adams attacks. Bradycardia and asystole in the attacks were treated by intramuscular injections; otherwise the drug was administered by the sublingual route, ½-1 tablet being given every 2-4 hours. In 3 cases of partial heart block the P-R interval was restored to normal, and in 4 cases with 2 : 1 block sinus rhythm was resumed. One case with Wenckebach's phenomenon failed to respond.

In 7 out of 12 cases of complete heart block sinus rhythm could be re-established and acceleration of the idioventricular rate was achieved in 4. One patient complained of vomiting. Four cases of complete heart block due to acute myocardial infarction reverted to sinus rhythm, and one patient with sinus bradycardia of 30-40 beats per minute had an increase in the pulse rate sufficient to enable him to resume work. The dosage has to be determined individually. There was no case of habituation. Some patients required small additional doses of phenobarbitone.

### Peripheral Neuropathy in Myxoedema

CREVASSE, L. E. AND LOGUE, R. B. (*Ann. Int. Med.*, **50** : 1433, 1959) from the Department of Medicine, Emory University School of Medicine, Emory University, Georgia, write :

Peripheral neuropathy manifested by severe lancinating extremity pains and/or paraesthesias occurred in 47 per cent of 65 patients with spontaneous myxoedema. It was the presenting and dominant complaint in three patients. The neuropathy may be the initial manifestation preceding the more overt symptoms of myxoedema. Because of anaemia, pallor and neuropathy, myxoedema is frequently confused with pernicious anaemia. The motor and sensory symptoms are out of proportion to neurologic findings, and may be confused with a primary degenerative disease of the central nervous system, nerve root compression or hysteria. The neuropathy is completely reversible by adequate thyroid replacement alone.

### Bacterial Arthritis

CHARTTER, Y., MARTIN, W. J. AND KELLY, P. J. (*Ann. Int. Med.*, **50** : 1462, 1959) from the Sections of Medicine and Orthopaedic Surgery, Mayo Clinic and Mayo Foundation, Rochester, Minnesota, in reporting on the results of treatment in 77 patients with bacterial arthritis observe :

Approximately a fourth of the 77 cases of bacterial arthritis encountered in a 19-year period at the Mayo Clinic were of the acute variety. Infections of the hip and brucellar, gonococcal, fungal and tuberculous infections were excluded from the study. In recent years the number of cases of bacterial arthritis at this institution has decreased, almost entirely because of the lesser number of chronic cases encountered. Penetration of the joint cavity by a wound, while less common in recent years, remains the most common mode of infection in our experience. In 70 patients the infection was monoarticular. The knee, ankle and small joints of the hands and feet were the sites most frequently involved. The microorganisms most often isolated from the involved joints were Staphylococcus pyogenes, Streptococcus pyogenes and gram-negative enteric bacilii. The majority of acute infections responded to conservative therapy, but most of the chronic ones required surgical measures. About two-thirds of the patients with acute infections treated after antibiotics became available had restoration of normal articular function, or were left with only minor disability. The chronic infections were less amenable to treatment, but since the advent of antibiotics the need for amputation has been rare. The disability that has resulted from chronic bacterial arthritis in the past should stimulate the physician to identify bacterial invasion of a joint promptly and to treat it properly.

### Chlorothiazide and Electrolyte and Water Excretion

HEINEMANN, H. O., DEMARTINI, F. R. AND LARACHI, J. H. (*Am. J. Med.*, **26** : 853, 1959) from the Department of Medicine of the Presbyterian Hospital, the Francis Delafield Hospital in the City of New York, and the College of Physicians and Surgeons of Columbia University, New York, give below the summary of their observations on the effect of chlorothiazide on renal excretion of electrolytes and free water :

Chlorothiazide was given intravenously to a group of normal human subjects and to one patient with diabetes insipidus, and its effects on renal function were compared with those of meralluride administered under similar circumstances.

Following the administration of chlorothiazide, the urine flow and solute output increased but the free water clearance did not increase. Administration of meralluride was followed by a comparable increase in urine flow, a lesser rise in solute output, and an increased excretion of free water.

Chlorothiazide produced a considerably greater increase in solute (sodium chloride) excretion than did meralluride. This difference was particularly evident in a sodium-depleted subject. The natriuretic effects of chlorothiazide occurred despite an average reduction in the glomerular filtration rate of 16·9 per cent.

Chlorothiazide also promoted the excretion of potassium, wheras meralluride had little effect on potassium excretion.

When given together, the response to meralluride and chlorothiazide appeared to be additive in respect to total solute excretion. However, the potassium diuresis of chlorothiazide was prevented by previous administration of a mercurial agent.

The findings perhaps suggest the presence of more than one renal transport mechanism concerned with the reabsorption of strong monovalent electrolytes. The observations can be explained by the hypothesis that meralluride acts only in the proximal tubule, while chlorothiazide affects solute (sodium and chloride) reabsorption both in the proximal and in the distal segments of the nephron.

### Mode of Action of Chlorothiazide in Hypertension

DOLLERY, C. T., HARINGTON, M. AND KAUFMANN, G. (*Lancet*, **1** : 1215, 1959) from the Department of Medicine, Postgraduate Medical School of London, from an analysis of the study on the mode of action of chlorothiazide made in hypertensive patients without heart-failure, with particular regard to the potentiation of ganglion-blocking drugs observe :

Single intravenous doses of chlorothiazide had no appreciable effect on the blood-pressure or on the hypotensive response to a standard intravenous dose of pentolinium.

After chlorothiazide by mouth for 3 days, an increased sensitivity to pentolinium developed in most patients. This correlated with a reduction in plasma-volume, and was abolished by replacement of the lost plasma-volume with salt-free dextran.

Postural hypotension due to chlorothiazide itself was observed in a few patients in whom the reduction in plasma-volume was large; this also was abolished after dextran infusion.

A diminution in plasma-volume is thought to be one of the main factors responsible for the increased effect of ganglion-blocking drugs in patients treated with chlorothiazide.

### Dihydrochlorothiazide in Control of Ascites

KERR, D. N. S., READ, A. E. AND SHERLOCK, S. (*Lancet*, **1** : 1221, 1959) from the Department of Medicine, the Postgraduate Medical School, London, write that five patients with liver disease were treated with alternate courses of chlorothiazide and dihydrochlorothiazide. A similar diuresis was produced by the two drugs, and potassium excretion was increased by roughly equal amounts.

The diuretic effect of 50 mg. of dihydrochlorothiazide is equivalent to that of 500 mg. of chlorothiazide.

Both of these drugs are effective diuretics in liver disease, but both are liable to cause of hypokalaemia and should, therefore, be given cautiously and with adequate potassium supplements.

### Hydrochlorothiazide vs. Chlorothiazide

FLEMING, P. R., ZILVA, J. F., BAYLISS, R. I. S. AND PIRKIS, J. (*Lancet*, **1** : 1218, 1959) from Westminster Hospital, London, write that hydrochlorothiazide is an effective diuretic. In healthy subjects it is, weight for weight, some 20 times more potent than chlorothiazide. In oedematous patients there are considerable individual variations, but usually hydrochlorothiazide is some 10 times more potent than the parent compound.

Hydrochlorothiazide promotes less bicarbonate excretion than chlorothiazide, but the loss of potassium after the two drugs is not significantly different. For this reason hydrochlorothiazide should be given intermittently and when treatment is continued for more than a few days supplements of potassium chloride are necessary.

### Liver in Ulcerative Disease of the Intestinal Tract

MONTO, A. S. (*Ann. Int. Med.*, **50** : 1385, 1959) from the Department of Public Health and Preventive Medicine of the New York Hospital—Cornell Medical Centre, New York, N.Y., gives in the following lines the summary of his observations on the functional and anatomic changes in the liver in ulcerative diseases of the intestinal tract :

One hundred clinical and 100 autopsied cases of ulcerative colitis were reviewed.

Thirty-seven per cent of the 200 patients had hepatomegaly or abnormal liver function tests or both excluding albumin-globulin ratio and prothrombin time.

In only 4 per cent of livers were no pathologic changes present at autopsy, other than congestion and pigmentation. Fatty infiltration was noted grossly in 64 per cent and microscopically in 80 per cent of livers.

Fifty clinical and four autopsied cases of regional enteritis were studied.

Hepatomegaly was noted clinically in 26 per cent of patients.

Three livers at autopsy showed some degrees of fatty changes.

A similarity was observed between the hepatic dysfunction found in regional enteritis and ulcerative colitis and that associated with the syndrome of diffuse amoebic hepatitis. Since in all three conditions the primary process is ulceration of the intestinal tract, it was postulated that absorption of "toxic material" or malabsorption of nutrients must be involved in the causation of the hepatic damage.

# CURRENT TOPIC

## THE CONTROL OF STAPHYLOCOCCAL INFECTION IN HOSPITALS*

### Objects of this Report

The objects of this report are to draw attention to the prevalence of staphylococcal disease in hospitals, to discuss the principles of prevention, to summarise accepted control measures and to indicate problems which need further study. The conclusions and recommendations are especially appropriate to hospitals where acute medical, surgical or obstetrical work is undertaken.

### Introduction

The prevalence of staphylococcal infections in hospitals is giving rise to growing concern. The fact that such infections continue to occur, in spite of increased understanding of the measures necessary for their control, may be attributed to various causes. During recent years much attention has been directed to the associated problems of resistance of staphylococci to the action of antibiotics. Many strains of staphylococci can withstand the action of an antibiotic either by their ability to grow in the presence of the drug or, as in the case of penicillin, by the production of a specific drug destructive enzyme. Experience has shown that the continued use of any antibiotic in a hospital community is accompanied by the emergence of staphylococcal strains against which the drug in question is powerless to act. Penicillin, in particular, now meets with limited success in the control of staphylococcal sepsis.

Drug resistance would be serious enough if it resulted only in failure to suppress staphylococcal disease. There is evidence however, that morbidity from staphylococcal infection may even be enhanced by the use of antibiotics. This may arise in at least two ways: by the selective encouragement in hospital communities of resistant strains of high infectivity or virulence; or by the elimination from individual patients of other bacteria in a competitive flora. The first of these may explain the emergence of certain highly virulent types of staphylococci, such as phage type 80; the second is probably an important factor in causing staphylococcal diarrhoea during oral antibiotic therapy.

The wide distribution of antibiotic resistant staphylococci has introduced a new and disturbing element into the field of hospital infections. This should not, however, be allowed to divert attention from the fact that staphylococcal disease was a major hospital problem long before the antibiotic era. The early promise which the antibiotics seemed to give, of increased protection against the effects of staphylococcal infection has not been fulfilled. The failure may in part be remedied by the more careful use of antibiotics, but this alone will not suffice. The essence of the problem remains unchanged, namely, to prevent infection by the application of aseptic methods.

The developments outlined above have led to a revival of interest in the principles and practice of asepsis. Many investigators have contributed to our knowledge of the sources and modes of spread of staphylococci and of the value of some of the measures advocated for their control. The sub-committee considers that the time is opportune to review accepted practices and recent advances in the field. The objects of this interim report are to reiterate the principles of prevention of infection, to set out those practical measures the value of which has been firmly established and to indicate those subjects of which more knowledge is needed before further detailed recommendations can be made with confidence.

### I. General Survey of Staphylococcal Disease in Hospitals

Potentially pathogenic strains of staphylococci are to be found so commonly in the general population, and particularly in hospital communities, as to justify the term "ubiquitous" which has so often been applied to them. Transference of such organisms from person to person may take place without the production of clinically recognisable lesions. It is not until colonisation of a susceptible individual, or implantation into a vulnerable site, has occurred that a problem of disease, as distinct from infection, will arise. For this reason there are certain departments of hospitals where different forms of staphylococcal disease are likely to prove most troublesome.

Skin sepsis, for example, may occur at any age but is of paramount importance during the neonatal period and constitutes a major hazard only in maternity units. Other forms of staphylococcal disease found mainly in maternity units include suppuration of the infant's eye, the umbilical stump or the mother's breast. Sepsis of wounds and burns is found mainly in surgical departments. Respiratory illnesses may occur in medical, paediatric, surgical, or maternity wards, either as a result of primary staphylococcal infection or as a complication of a respiratory virus disease such as influenza. Enteritis associated with the oral administration of antibiotics may be observed in both medical and surgical wards. Genito-urinary tract infections occur usually in surgical or gynaecological wards.

Table 1 sets out the common anatomical sites of staphylococcal infection and the nature of the lesions which may result. From any one of these sites extension of the infective process may take place to adjacent tissues or into the blood stream, giving rise to conditions such as cellulitis, empyema, peritonitis, pyaemia, septicaemia, endocarditis and meningitis. Many localised staphylococcal lesions are trivial in themselves but, by acting as sources of infection to others, they form the background to these more serious illnesses which may well prove fatal.

Divergent opinions have been expressed about the prevalence of staphylococcal disease partly, perhaps, through failure to discriminate between the incidence of infection, in the bacteriological sense of the word, and the incidence of clinical sepsis. The clinical manifestations of staphylococcal infection vary widely in their severity, and figures for sepsis rates, therefore,

* From the Report of the Sub-Committee of the Central Health Services Council, U. K., on Staphylococcal Infection in Hospitals.

TABLE I—COMMON SITES OF STAPHYLOCOCCAL INFECTION

| Site of infection | Nature of lesion |
|---|---|
| *Skin ... ... | Furunculosis, impetigo pemphigus neonatorum, other pustular eruptions. |
| Breast ... ... | Abscess, cellulitis. |
| *Umbilical stump ... | Suppuration. |
| Wounds ... ... | Sepsis. |
| Burns ... ... | Sepsis. |
| Eye ... ... | Conjunctivitis, ophthalmia neonatorum. |
| Ear ... ... | Otitis externa, otitis media. |
| *Nose ... ... | Furunculosis. |
| Respiratory tract ... | Sinusitis, pharyngitis, laryngitis, tracheitis, bronchitis, pneumonia, lung abscess. |
| *Intestinal tract ... | Post-therapeutic diarrhoea. |
| Genito-urinary tract ... | Urethritis, cystitis, pyelitis. |

* These are also common healthy carrier sites.

need to be interpreted in terms of the clinical criteria which have been adopted. In surgical practice the occurrence of frankly purulent discharge from an initially clean operation wound is commonly classified as serious sepsis. The incidence of this is by no means negligible. A figure of 5 per cent is not uncommon and rates of more than 10 per cent have been recorded. Serious sepsis in maternity units is perhaps less frequent, though the incidence of minor lesions of the skin or eyes may be high. Minor sepsis rates of 5 per cent to 20 per cent are not exceptional.

Such observations leave little doubt that a sizeable problem of staphylococcal disease exists, though it may well be overlooked if a hospital has no adequate system of recording or if appropriate facilities for bacteriological investigation are lacking.

## II. DISCOVERING AND RECORDING CASES OF INFECTION ("ASCERTAINMENT")

For ordinary purposes what is needed is continual observation, both of patients and of staff, for clinical signs of infection and the maintenance of accurate records of the findings. The present report is concerned specifically with staphylococcal infections but it is evident that disease caused by other organisms will also enter into the same set of primary observations and record. The object is to enable the responsible hospital authority to have information about the incidence of clinically recognisable infection readily available at all times. This information forms the necessary background to any scheme of control. It is needed:

(a) to assess the efficacy of the regular preventive measures in use in the hospital;

(b) to recognise, by any unusual level or change in level of incidence, the existence or impending spread of an outbreak; and

(c) to judge the desirability of introducing special measures to control an outbreak, or threatened outbreak, and to assess the efficacy of such measures.

If the purposes for which the information is required are kept clearly in mind, the detailed procedures for its collection in a particular hospital are best determined by those who know the local circumstances. Nevertheless, certain principles have a fairly general application and these are set out in the remainder of this section.

*The patient in hospital*—The clinical supervision of the progress of a patient in hospital, which is the direct responsibility of medically qualified members of the staff, should include examination for evidence of intercurrent infection. In certain circumstances part of this function can justifiably be delegated to members of the nursing staff who may, in the course of their routine duties, be in a better position to observe the earliest signs of infection. The dressing of surgical wounds is commonly undertaken by nurses and it is the dresser's responsibility to look for wounds sepsis. Similarly, in maternity units the nursing staff, when attending to the toilet of their patients, should watch the infants for septic lesions of the eyes, skin or umbilicus and the mothers for lesions of the nipples, breasts or perineum. In all cases the nurse should record the facts and bring any evidence of infection which she may have observed to the notice of the ward sister who, in turn, should inform the clinician in charge of the patient, so that appropriate therapeutic and preventive action can be taken.

It is not uncommon for the clinical effects of infection acquired in hospital to be delayed until after patient has been discharged. Whenever a surgical patient is discharged from hospital, or transferred to a convalescent home, it is important that clinical supervision should continue until all wounds have completely healed and no further likelihood of development of sepsis exists.

The same argument applies with particular force to the ascertainment of cases of mastitis or breast abscess among mothers delivered in hospital. Maternal breast abscesses may develop several weeks after discharge from hospital, though the source of infection may have lain in the maternity unit. Reports of recent outbreaks of staphylococcal infection in maternity hospitals have confirmed the late onset of most breast abscesses.

*Staff*—It should be impressed on all members of the staff—medical, nursing, auxiliary and domestic—that they should report any minor ailment, including septic lesions of the skin, however trivial. Staff when on duty would normally report, in the first instance, to the person in charge of the department in which they are working. This person should refer for a medical opinion any member of the staff thought to be suffering from an infection. It is on voluntary reporting that the detection of clinical evidence of infection among members of the staff depends and their attention should be drawn to this at regular intervals.

*Bacteriological investigations*—In all cases of suspected staphylococcal disease it is desirable to confirm the diagnosis by the bacteriological investigation of

appropriate specimens. In ordinary circumstances staphylococci can be recognised by their cultural appearance, and the coagulase test used as an index of potential pathogenicity. Type identification is not normally required except in the investigation of an outbreak. It is, however, highly desirable that hospital laboratories should keep strains of staphylococci for at least three months, in case the need for type identification should later arise. The investigation of an outbreak may be greatly hampered in its early stages if staphylococcal strains, isolated before the outbreak began have been discarded.

*Records*—When clinical evidence of infection, either of a patient or of a member of the staff, has been observed, a record of it should be entered in the individual's case-notes. The information contained in these, however, is not accessible enough to provide a ready means of estimating the incidence of staphylococcal or other disease throughout a hospital. For this purpose a separate set of records is needed—simple, comprehensive and readily available.

The minimum relevant information consists of the identity of the individual, the nature of the lesion and the date on which the lesion was first observed. It is also desirable to indicate whether or not specimens were taken for bacteriological investigation. A record of this information should be kept in every ward, or group of wards, in casualty and out-patient departments and in staff sick-quarters. In surgical, maternity and paediatric wards it is desirable to keep fuller records than elsewhere and an entry should be made for each patient, whether clinical signs of infection develop or not. Such a record is more likely to be complete and readily available than one which is restricted solely to notes on patients found to have become infected.

The precise form in which these records are maintained is of less importance than their content, but a well-run system simplifies the task of collation. For the ward unit a book is probably better than loose-leaf notes. This may be termed the "wound book", "sepsis book" or "control of infection register."

The nursing sister in charge of a department or ward unit is usually the most suitable person to keep the Control of Infection Register or its equivalent. This has obvious advantages when more than one clinician is responsible for patients under treatment in the unit. Findings recorded at the time of observation are likely to prove more reliable than entries made retrospectively. It should be emphasised that the keeping of records is not an end in itself; the information contained in them should be examined regularly by the clinician in charge.

The maintenance of Control of Infection Registers will meet the requirements of ascertainment so long as the patients remain under treatment in the same hospital. More is needed if the process is to continue, as it should, after their discharge or transfer. For this purpose some kind of follow-up record is indicated.

It is essential to have one person responsible for scrutinising all hospital sepsis records. This would normally be the Control of Infection Officer, to whom executive functions have been delegated by the Control of Infection Committee. It is he who should see that the Control of Infection Registers are maintained and that the information recorded in them is collated and brought to the notice of his colleagues and of the appropriate hospital officers or committees. In this context two distinct needs arise :

(a) for a general summary of the levels of clinical infection in the various wards and departments of a hospital,
(b) for a specific report in the event of an outbreak or threatened outbreak.

### III. Sources of Infection and Modes of Spread

In the extensive literature which has been devoted to the subject of hospital infections, the term "source of infection" has been commonly applied not only to sites where micro-organisms are multiplying but also to inanimate objects contaminated with such organisms and even to the air of the operating theatres or wards. The word "reservoir" has also been used, with the same broad connotation, as synonymous with source. These usages differ somewhat from the meaning which are attached to the words "source" and "reservoir" in general epidemiological studies. While this may seldom give rise to ambiguity, when taken in the appropriate context, it is worth preserving the distinction between a "source" of infection, such as a septic lesion or a persistent nasal carrier, where organisms are multiplying, and a "depot" of infection, such as a contaminated utensil or transient skin carrier, which acts merely as a resting-place or a vehicle for viable organisms. It is unfortunate, for example, by using the phrase "source of infection" in its broader sense to convey the impression that staphylococci commonly proliferate in floor dust, though it is within the experience of members of the sub-committee that conclusions of this kind have been loosely accepted in some hospitals. Such a belief is likely to result in false emphasis on the relative merits of different measures of control. For this reason, while admitting the possibility that pathogenic staphylococci may occasionally multiply under favourable conditions on inanimate objects, it is proposed in the present section of this report to restrict the use of the term "source of infection" to sites of multiplication in living tissue.

*Source of infection*—For practical purposes animal reservoirs of infection may be ignored in any consideration of staphylococcal infections in hospitals. The sources, therefore, can be accepted as existing in human tissues. These may be classified into two main categories :

(a) Septic lesions.
(b) Sites of inapparent infection
  (i) associated with subclinical wound infections.
  (ii) in healthy carriers, e.g., in the nasal passages.

The tissues in which the principal septic lesions associated with staphylococcal infections occur—skin, breast, umbilical stump, wounds, burns, eye, ear, nose, the respiratory, intestinal and genito-urinary tracts—may also be the seat of inapparent infections. The length of time for which pathogenic organisms may persist during convalescence from staphylococcal disease or following inapparent infection is highly variable. The duration of the healthy carrier state also varies. Some persons

appear to carry staphylococci in their nasal passages indefinitely : others carry them intermittently for a few days or weeks. The persistent carriers commonly carry one strain for long periods; the intermittent carriers carry different strains from time to time. The sites of election for the multiplication of staphylococci in persistent health carriers are the anterior nares, the intestine and certain areas of the skin, such as the perineum.

*Transference of infection*—Transference of organisms may occur from the source of infection to another site on the same individual (self infection) or to another individual (cross-infection). In either instance the mode of transmission may be direct or indirect. Since staphylococci are moderately resistant to drying and retain their viability for considerable periods after their release from the host, transmission can follow a variety of routes.

Many factors are concerned in determining both the availability of routes for the spread of staphylococci and their chances of successful colonisation at a new site. In spite of the very considerable amount of research that has been devoted to the problem it is still not possible to define all the factors or to estimate precisely the relative importance of those which are known to be operative. The liability for clinical infection to develop after transference of staphylococci to a new site is dependent partly on the virulence of the strain, partly on the susceptibility of the recipient host tissue and partly on the number of viable organisms transferred. It is this quantitative aspect that introduces a complexity to the problem which can be satisfactorily resolved only by a judicious combination of clinical observation and bacteriological investigation.

*Virulence of staphylococci*—The coagulase test is the most useful laboratory criterion of pathogenicity of staphylococci and it is wise to regard all coagulase-positive staphylococci as potentially pathogenic. Experience of the last few years show, however, that some coagulase-positive strains have a greater capacity for producing sepsis, and for causing epidemics in hospitals, than others. Unfortunately no laboratory test is yet available for distinguishing the more virulent strains; they can only be recognised with certainty as such when they have produced sepsis, or epidemics. A few phage types are particularly prone to be virulent, but the correlation of virulence with phage type is not close enough to justify typing for predicting virulence

*Dispersal of organisms from their source*—The number of organisms available for transference to a new site is dependent partly on the number present at their source and partly on the ease with which they can be dispersed. An abundant discharge of pus from a septic lesion provides a large number of organisms at the source. It is evident that any such lesion constitutes a major hazard to other persons in the environment and necessitates the adoption of measures to limit dispersal. The degree to which dispersal does occur, either under natural or controlled conditions, will depend on the site and nature of the lesion and the control measures employed. For this reason some lesions are potentially more dangerous as sources of infection than others. A septic wound, for example, if adequately covered may be rendered relatively harmless to other persons by the use of careful dressing techniques in a properly designed treatment room, whereas the presence in an open ward of a patient suffering from a staphylococcal lung abscess may create a situation which can only be met by removal of the patient to isolation accommodation.

Although some septic lesions can be recognised as potentially more dangerous as sources of infection than others, the degree of dispersal of organisms from them is not always predictable on clinical grounds. Similarly, healthy carriers vary greatly in their ability to disperse staphylococci from the nose, fauces or skin into their environment. The first step in the indirect transference of staphylococci from their source is usually by contamination of the skin and clothing of the carrier. The organisms may then be transmitted by contact to other persons or to objects, such as bedding or towels, or by air-borne particles or dust released from the skin or clothing.

*Susceptibility of host tissues*—Just as persons and some lesions constitute particular hazards as sources of infection, so some persons and some tissues are exceptionally vulnerable to attack, and when both co-exist in circumstances favourable to transmission the risk of cross-infection may be greatly increased. Young infants are at special risk. So also, are persons of any age who are under treatment in hospital with broad-spectrum antibiotics and those in the acute stage of certain virus infections, such as influenza or measles, in whom staphylococcal pneumonia may prove a fatal complication.

The vulnerability of tissues in otherwise healthy persons is enhanced by trauma. Excoriation of the skin forms an important predisposing factor, for example, in the development of pemphigus neonatorum. Surgical wounds are particularly prone to staphylococcal infection. The adverse influence of the presence of foreign body reactions in wounds has long been recognised on clinical grounds and has recently been the subject of experimental confirmation.

*Modes of spread*—Direct transmission from person either by contact or by air-borne droplets, may not be a common mode of spread but, when it occurs, may have potent effects. Examples of direct transmision are : by contact of a septic lesion of the finger of a nurse with a patient's wound or by air-borne droplets from a lung abscess expelled by coughing.

Indirect transmission by way of contaminated articles is much the commoner mode of spread. The greatest hazard comes from articles which have been closest to the source of infection, such as the dressings from septic wounds, the instruments which have been used for dressing them and the gloves or fingers of the attendants.

Most of the inanimate objects in the hospital environment may act as depots for staphylococci. These include articles of clothing, handkerchiefs, toilet articles, crockery and cutlery, thermometers, sputum containers, bedpans, urinals, sheets, blankets and other bed coverings, pillows, mattresses, bedsteads, bed curtains,

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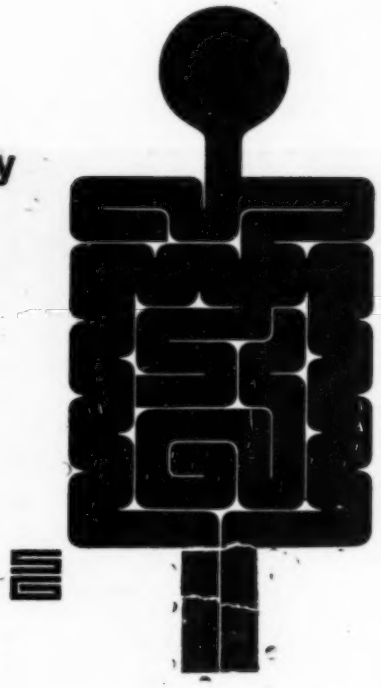

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screens, other ward furniture and accessories, examination or treatment couches, walls, floor, baths, wash basins, sluices and water closets. These objects may become contaminated either by contact with the source of infection or by air-borne droplets. They may in turn pass their contamination to persons or to other inanimate objects, in either case by contact or by means of air-borne particles or dust. The essence of effective control measures is to break the important links in these chains of infection at as many points as may be practicable.

### IV. Principles of Prevention

The principles underlying the various measures, which have been recommended for the prevention of staphylococcal infection may be classified as follows:

(a) provision of adequate accommodation and staff;
(b) treatment of sources of infection;
(c) segregation of sources of infection;
(d) limitation of the dispersal of organisms from their sources or depots;
(e) protection of susceptible persons and of vulnerable sites;
(f) prevention of contamination of the environment, including the protection of clean or sterile articles;
(g) decontamination of the environment, including disinfection or sterilisation of equipment.

The effective application of these principles depends on their combination in a balanced scheme of control.

*Provision of adequate accommodation and staff*—Important practical requiements for the prevention of hospital infection are adequate space for the patients' beds and facilities for isolation. It is equally important to allow enough time for the staff to carry out the preventive measures which are needed. The aggregation of susceptible persons within a hospital results in an increased risk of exposure to infection and undue congestion, either in space or in time, enhances this risk. It is necessary, therefore, to ensure that the accommodation is sufficient for the number of patients who are to be admitted, and that the staff is adequate both in number and training. Conversely, every effort should be made to keep the rate of admission of patients at a level appropriate to the accommodation and staff available. This precaution is especially desirable when it is known that cases of infection are occurring.

Overcrowding of patients may militate against a satisfactory turnover by prolonging the stay of those who become infected or by the closure of wards as the result of outbreaks. The practice of "lodging" patients temporarily in the hospital, has obvious dangers and should be adopted only when circumstances make it essential and with adequate precautions against spread of infection.

*Treatment of sources of infection*—The prompt treatment of staphylococcal lesions reduces their period of infectivity. Resistance to antibiotics is one of the chief obstacles to the achievement of satisfactory results. As part of this problem has developed from the widespread, and possibly indiscriminate, use of antibiotics, clinicians should be prepared to consider certain voluntary restrictions:

(a) to keep certain antibiotics (e.g. erythromycin) in reserve, for the treatment of patients infected by organisms resistant to the drugs more commonly used;
(b) to limit the authority to prescribe reserved antibiotics, except in emergency, to senior members of the medical staff and to consider the desirability of withholding the administration of such antibiotics until the results of sensitivity tests are known;
(c) to abandon the widespread use of antibiotics for non-specific prophylaxis; attempts at prophylaxis in surgical practice frequently fail in their object because the drug used proves to be ineffective against the organisms which gain entry to the wound and continued prophylactic use of an antibiotic in a hospital helps to increase the load of resistant strains. There are, of course, special circumstances in which prophylactic use is fully justified.

A special problem is that of members of hospital staff with recurrent staphylococcal lesions. Good response in such cases has been reported from the local application to the nose of antibiotic or disinfectant preparations. To achieve consistent results by these means it is essential to ensure that staphylococci from the nose are of the same type as those responsible for the lesions. Bacteriological investigations are therefore necessary before treatment is begun. Treatment of healthy nasal carriers is usually unnecessary except in the presence of an outbreak.

*Segregation of sources of infection*—Members of the staff (medical, nursing or ancillary) with a staphylococcal lesion should not remain on duty where there are patients at risk. Patients with septic lesions should either be isolated in single rooms or segregated in special wards.

*Limitation of the dispersal of organisms*—The dispersal of organisms from a discharging staphylococcal lesion can be limited to a considerable extent by covering the lesion with an adequate dressing, though too much reliance should not be placed on this alone. It is during the changing of dressings that the greatest dispersal of organisms from a lesion is liable to occur and the control of this is one of the main purposes of a good dressing technique.

The clothing and bedding of an infected patient are second only to soiled dressings as a means of dispersal of organisms. The bedding of other patients also may become secondary depots for further dispersal. This is at its height during bed-making and changing of linen.

Cleaning activities in the ward and other movements, such as the drawing of bedside curtains, also disperse organisms from their resting places on the floor and elsewhere. Dust-laying oils are suitable for wooden floors. The alternative to oiling is the frequent removal of dust by methods designed to minimise dispersal, e.g., damp dusting, piped suction of the use of vacuum cleaners provided with efficient air filters.

The most important means of dispersal into the air by staphylococcal carriers among the staff is from the everyday clothes or normal working uniform. This is not much reduced by the wearing of gowns over contaminated clothes. Simplification of nurses uniforms so that clean garments may be worn each day and the use of washable aprons are matters that need further investigation.

In operating theatres or delivery rooms all staff should change their outer clothing for any open surgical or obstetric procedure and should wear special boots or over-shoes. Dispersal of organisms can also be limited by restricting the number of persons in the theatre to those performing some essential function and by reducing unnecessary movement of staff.

*Protection of susceptible persons and vulnerable sites*—Patients who are undergoing treatment with an antibiotic reserved for resistant infections should preferably be isolated in single rooms. Wounds should ideally be dressed in properly designed treatment rooms. If the dressing of wounds in an open ward is unavoidable it is best done at a time when there are few activities and no visitors. Disturbances such as the cleaning of floors and the drawing of bedside curtains should be completed at least 15 minutes before dressings begin. Care should be taken that only sterilised material comes into contact with a wound and the skin surrounding it.

Infants' toilet should conform as far as possible to a wound dressing technique. Particular care is needed in the nursing of premature infants.

Staff exposed to risk of infection should be protected by the wearing of gloves, gowns and masks or other protective clothing.

The possibility of the introduction of staphylococcal infection by visitors should be borne in mind in deciding where and when visiting is to be allowed. Visitors known to be suffering from an infection should not be permitted to enter the wards.

*Prevention of contamination of the environment*—Any of the measures which tend to limit the dispersal of organisms from their sources will also lessen the contamination of the environment. The value of isolation in this context is that unavoidable contamination of the environment by infected persons can be restricted to a defined area, from which organisms can be prevented from spreading by the use of appropriate techniques.

Particular attention should be directed to the proper disposal of articles removed from a heavily contaminated environment. These should be placed in suitable containers and removed for disposal by a route that does not lead through places in which sterile materials are exposed. For example, soiled dressings should never be brought into a room where clean dressing trolleys are being prepared.

The hazards of air-borne contamination can be reduced by controlled ventilation. In operating theatres, control of air-borne bacteria can best be achieved by positive pressure ventilation with filtered air. The ventilation of surgical dressing rooms should be controlled so that effluent air does not gain access to the wards.

*Decontamination of the environment*—The general cleanliness of all parts of a hospital makes an important contribution to the prevention of infection. Contaminated articles should be dealt with incineration, sterilisation or disinfection. Sterilisation by heat, whenever practicable, is to be preferred to chemical methods of disinfection.

The disinfection of articles used by a patient, or for the patient's treatment, has long been an established procedure in hospitals.

Further investigation is needed for the value of irradiation by ultraviolet light as a means of reducing the bacterial content of air.

## V. Practical Details of Some Preventive Measures

The need for co-ordination of individual preventive measures and for their integration into the normal working life of the hospital introduces a complexity to the problem of control of infection that cannot be satisfactorily resolved by concentrating only on a few aspects of it. Because of the variety of routes by which staphylococci can spread, the application of any single preventive measure may not greatly affect the incidence of sepsis. A wide range of precautions is generally needed to do this. An ideal system of control is unlikely to be attained except in a few fortunately placed hospitals but it is the opinion of this sub-committee that much can be achieved, even under difficult conditions, by intelligent use of existing resources.

*Accommodation*—In an open general ward the minimum distance between bed centres should be kept at 8 feet. This distance could with advantage be increased to 12 feet if multi-bedded wards are used for the segregation of patients with septic lesions.

A sufficient number of single rooms should be available for the isolation of patients and members of the staff with septic lesions. In new hospitals now being planned or built the proportion of single rooms available for all purposes is generally not less than 20 per cent of the total beds, but a responsibility falls on existing hospitals to make the best provision they can. All single rooms should be provided with the necessary facilities for isolation nursing. The practice of including isolation beds, which it may be necessary to hold in reserve when empty, in the statistics of bed occupancy may have an adverse psychological effect in discouraging the reservation of adequate isolation accommodation. When isolation accommodation within a hospital proves to be inadequate consideration should be given to the transfer of patients to other hospitals, e.g., infectious diseases hospitals, with the necessary facilities. Alternatively, patients with septic lesions may be segregated in multi-bedded "septic" wards, though this arrangement is less satisfactory than isolation in single rooms.

In maternity units further investigation is needed of the effectiveness of strict "rooming-in" of mothers and infants. There are arguments for and against the use of communal nurseries. From the point of view of infection there would seem to be no materially greater hazard to the infant in a communal nursery than to the infant at the mother's bedside in an open ward. In all circumstances attention should be given to adequate

spacing and to facilities for isolation. A floor space of 30 square feet per cot should be allowed in all nurseries and this should be increased to 50 square feet per cot in premature baby nurseries.

In surgical units mechanically ventilated dressing rooms are desirable. Other ancillary rooms should be adequate in size for the purpose for which they are intended and planned with due attention to the need for protecting clean or sterile materials from contamination. Where existing ancillary rooms are inadequate in size or in lay-out, consideration should be given to structural alterations even if this means encroaching on the general ward space and reducing the number of available beds.

In operating theatre suites separate rooms are needed in which members of the surgical and nursing staff can change their clothing. These should preferably include a shower or bath. Sterilising rooms should be separated from the theatre. Sluice rooms should be separated both from the theatre and from the sterilising room.

*Washing facilities*—It is essential that facilities for hand-washing are readily accessible in all situations where they are likely to be needed, both in open wards and in isolation accommodation. The taps of fixed wash-basins or scrubbing-up stalls should preferably be knee or foot-operated. Where elbow-operated taps are in use, supervision of staff is needed to ensure that they are in fact operated with the elbows and not by hand. All taps should be inspected regularly and serviced as required in order to ensure that they are functioning correctly. An adequate supply of clean towels is essential. Automatic towel dispensers and paper towels have some advantages.

*Supplies*—The supply of gloves, masks, gowns, instruments, bowls and other equipment needed for the maintenance of effective preventive measures must be adequate for the purpose intended. Shortage of supplies leads to short cuts in techniques with added risks of infection. The stocks held in wards and operating theatres should be reviewed regularly, in consultation with the sister-in-charge, to ensure that needs can be met. Extra supplies should be available to meet temporary requirements.

*Organisation of staff*—Shortage of staff is one of the most serious hindrances to prevention of hospital infection. Work should be so organised as to make the best use of skilled staff.

Nurses and nursing orderlies should be trained in techniques for their own protection and the protection of patients from infection. No-touch techniques in surgical dressings serve the double purpose of protecting the patient and the dresser. In the dressing of septic wounds the wearing of a gown and mask may lessen the risk of development of a carrier state in the dresser.

The wearing of a gown will protect the clothing of the attendant from contamination during the handling of patients, bed-making and other procedures. Staff employed in cleaning baths, wash-basins, water-closets and other contaminated articles should wear intact rubber gloves for the purpose. Protective clothing should be worn by any member of the staff handling heavily contaminated materials.

A member of the staff who has been absent from duty owing to a staphylococcal infection should be seen by a doctor before returning to duty in order that he may ensure that the individual is unlikely, by a resumption of normal activities, to prove a source of infection to patients or to other members of the staff. In cases of doubt the opinion of the hospital's Control Infection Officer should be obtained. It should be remembered that even when clinical resolution of a staphylococcal lesion appears to be complete bacteriological evidence of continuing infection may still be found.

*Isolation nursing*—Rules for isolation nursing are given in Appendix I to this report. These rules are applicable to patients with septic lesions isolated in single room or segregated in open "septic" wards.

*Dressing of wounds and burns*—Wounds and burns should be uncovered as infrequently as possible. Dressings should be changed no more often than is necessary. In general, clean surgical wounds need to be exposed for inspection only at the time of removal of clips or stitches.

Any delay which occurs during the changing of dressings increases the risk of exposure to infection. Temporary covering of a wound, while awaiting inspection by the surgeon, does not entirely obviate this increased risk.

Rules for the performance of wound dressings are given in Appendix II to this report.

*Operating theatre practices*—Suggestions for prevention of infection in operating theatres are given in Appendix III to this report. Aseptic precautions should of course also be observed in x-ray departments and elsewhere when operative manipulations (e.g. catheterisation) are performed.

*Gloves*—The use of unpunctured gloves for surgical operations, both by the surgeon and the immediate assistants, is essential. All gloves should be tested for leaks by filling with air and immersing in water. Other methods are unreliable.

Gloves which are observed to have become punctured during the course of a surgical operation should be changed without delay.

*Masks*—Masks should be worn for all isolation nursing procedures, surgical operations, deliveries, wound dressings, nursing of premature babies, preparing babies feeds, performing spinal or thoracic punctures. They should be made either of 6 layers of muslin or of 2 layers with one impervious layer of paper or cellophane inserted. Expendable paper masks are now available.

*Gowns*—Gowns should be worn for all the procedures mentioned under masks and, also, in maternity nurseries.

*Hand-washing*—Washing does not sterilise the hands but it does effectively remove recent contamination from the skin. Further investigation is needed of the optimum length of time for hand-washing and of the value of disinfectant soaps or creams. In the present state of knowledge it would seem reasonable to prefer short periods of washing undertaken as an invariable routine, to an occasional "long scrub".

It is recommended that surgeons should scrub-up for 5 minutes at the beginning of an operating list and wash again before each succeeding operation on the list. In the wards, all those in attendance on patients should wash before and after each time of service. The hands of the attendant should be washed between dressings, whether gloves are worn or not.

*Preparation of skin*—For the preparation of the skin of patients before surgical operations a preliminary soap and water wash may be followed, when the patient is on the operating table, by the application of a suitable skin antiseptic. This is probably as effective as more elaborate methods, but the problem needs further study.

*Blankets*—Blankets should be laundered, at least with each change of occupant of a hospital bed or cot, by a process which effectively reduces the bacterial load which they carry. Blankets from a ward should not be taken into the clean part of an operating theatre suite.

So far as concerns control of infection woollen blankets have some disadvantages in hospital work. These arise not from any defect in use but from the damage to woollen fabrics which results from laundering or sterilisation by heat.

*Mattresses*—Further investigation is needed of foam rubber mattresses suitable for surface disinfection by chemical methods. In some hospitals mattresses are disinfected, either by heat or by formaldehyde vapour, on the discharge of each patient. As an alternative to the disinfection of the entire mattress the use of an impermeable polythene cover has been advocated. This should be destroyed on the discharge of each occupant.

*Linen*—Canvas bags on wheeled frames are recommended for collecting soiled linen at the bedside. Covered sanitary bins containing disinfectant fluid are needed for fouled or infected linen or clothing and for infants' napkins.

*Disinfection and sterilisation*—Sterilising equipment should be of satisfactory type, should be regularly inspected and kept in good order by the hospital engineer, and should be regularly tested by the hospital bacteriologist.

Contaminated dressings should be placed in impervious paper containers and burned in a properly designed incinerator.

## VI. Control of Outbreaks

Routine records of the level of sepsis can be compared with those of other hospitals and will often indicate changes in prevalence that may presage a definite outbreak. The Control of Infection Committee of any hospital should have its own defined plan as to what change in prevalence brings into play the special investigations suggested below. This might be doubling of the sepsis rate, or increase by a given percentage.

One of the chief difficulties in controlling outbreaks has often been that they have gone on too long uninvestigated. A pre-arranged indication for further investigations should help to overcome this. Not all hospital laboratories are or can be fully equipped for extensive bacteriological investigations. The need to seek help or consultation with the Medical Officer of Health or Public Health Laboratory Service should not be regarded as an adverse reflection on the hospital, but simply as the rational use of specialist advice and facilities. Whereas the routine sepsis record would normally be based on clinical observations only, in face of an outbreak it must be made bacteriological as well. The staphylococci from the lesions should be submitted for type identification.

*Epidemiological and bacteriological investigations*—When an outbreak of staphylococcal infection occurs, the first action should be to make a list of the patients thought to be involved. This list should include :

Name, sex, ward; primary diagnosis.
Date of onset of sepsis and its nature.
Type of staphylococcus.
Any special treatment given.
For surgical wounds : date of operation; operating theatre and surgical team; date of any post-operative wound dressing before appearance of sepsis; name(s) of dresser(s).
For mothers and infants : date of delivery; labour ward; midwife.

The epidemiological analysis should indicate one or more places (or times) in which the patients could have become infected. If most cases of sepsis develop soon after operation (and especially if before the first post-operative dressing), with pus in the depths of the wound, introduction of infection in the operating theatre should be suspected. It may be that one surgical team, or one surgeon in a team, has more patients who become infected than the others using the same theatre; or it may be that one operating theatre appears more dangerous than others used by the same team.

The bacteriological investigations should show whether the patients are infected by many different phage types, or by one phage type of staphylococcus only. In any large epidemic it will be rare for all the patients to be infected by a single type, but a clear predominance of one type should in these circumstances justify concentration on that type at first.

*Infections due to several phage types of staphylococci*—The presence of several different types among the patients infected in a staphylococcus outbreak indicates that the pathways from many sources of infection are open. From the preliminary epidemiological listing it should be possible to decide whether the operating theatre is likely to be the point at which the sources of infection are impinging on the patient. If this is the case, investigation should be made of the ventilation of the theatre and of the general hygienic precautions there, with special attention to the clothing of the staff and the possibility that ward blankets, etc., are brought in with the patient.

A variety of type responsible for infections apparently introduced in the ward probably indicates a defective aseptic routine for dressings there; the techniques used and the facilities available should be reviewed.

One other reason for infection of wounds by a variety of types, though one unlikely to lead to an epidemic, is self-infection from carrier sites on the patient himself. In acute surgical wards this is likely to result in a proportion of infections due to antibiotic-sensitive

staphylococci, but in long-stay hospitals the patients may become carriers of the drug-resistant hospital strains before operation and then become infected by them.

*Single phage type epidemics*—The dominance of one type may indicate that the patients are all infected from one source, or that a single type has become so widespread in the hospital that infections from various sources are still all of one type. In either case the aim must be to get rid of the source, or sources, of infection—either the single dangerous carrier or the widespread dangerous strain.

It is in this situation that a search for carriers ought to be made. Such a search should be confined to the persons working in the place which the epidemiological investigation suggests to be important; and it should include a search for minor infected lesions as well as healthy carrier sites. Type identification will be needed to discover which of the staphylococcal carriers, if any, is harbouring the epidemic type. Antibiotic (especially penicillin) sensitivity may be a useful screening test for this purpose, but should not be relied on too far. In the ward, patients—either healthy carriers or with some subclinical infection—need to be considered as well as staff.

A fair number of epidemics have been described, both in surgical units and maternity hospitals, in which a single person was apparently directly responsible for a large number of cases of infection. In such circumstances the epidemic can be terminated by exclusion and treatment of the person responsible.

Where it seems that the dominance of one type of staphylococcus is due to the invasiveness or communicability of the organism rather than to dispersal from one source, the attempt has to be made to eliminate all sources of that strain. All cases of sepsis (including chest, intestinal and urinary infections) due to the epidemic type should be isolated. All cases of subclinical infection and all carriers of the type should be treated vigorously to render them non-infective; in the face of a serious epidemic patients should be isolated and staff excluded from duty until they are free from infection. Bed clothes, etc., from infected patients should be sterilised.

Nasal carriage of *Staph. aureus* can usually be controlled by local application of creams containing such antibiotics as neomycin, bacitracin and gramicidin, or chlorhexidine. For skin carriage, chlorhexidine cream of hexachlorophene-containing soaps are probably useful.

When a particular staphylococcus has been prevalent in a ward for any length of time, contamination of persons and things may be very widespread and further infection may not be controlled by the measures just listed. It may then be necessary to empty the ward of patients to permit more thorough disinfection. This should comprise disinfection of all bedding, curtains and other fabrics, and washing of walls, furniture and fixtures with disinfectant, with or without fumigation with formaldehyde vapour. The ward should be reopened only with close bacteriological surveillance of patients and staff to ensure that no carriers or persons infected with the epidemic type are readmitted. The disturbance caused by these measures emphasises the importance of detecting and dealing with outbreaks at as early a stage as possible.

## VII. Administrative Considerations

The administration of schemes of control of hospital infection involves both internal relations and liaison with outside bodies. This section sets out recommendations for the distribution of functions and the channels of communication.

*Control of Infection Officer*—Within the hospital it is essential to have one person responsible for reviewing information on the incidence of sepsis, and co-ordinating preventive measures. The choice of this control of Infection Officer should be carefully considered because the success of any scheme of control will largely depend on him. Nomination could well be made by the Control of Infection Committee (see below) with the approval of the Medical Staff Committee.

The Control of Infection Officer must be in a position to advise in his own right and should therefore be a senior member of the medical staff. The hospital bacteriologist is often the person of choice, but clinicians might well be encouraged to take close interest in this work.

The functions of the Control of Infection Officer are to keep the responsible members of the hospital staff informed of the incidence of sepsis, to advise preventive measures and to check their efficacy. His information and advice may be given informally or at meetings of the Medical Staff Committee or the Control of Infection Committee. He could, with advantage, help in the training of staff.

*Bacteriologist*—The hospital bacteriologist (or pathologist) should undertake responsibility for checking the efficacy of sterilisation and disinfection.

*Matron*—The matron should ensure adequate training and supervision of nursing staff and, in consultation with the domestic supervisor if any, of domestic staff. Training may be delegated to a senior sister or sister tutor. The Control of Infection Officer may be able to assist.

The matron should be responsible for the co-ordination of requests by members of the nursing staff for equipment or facilities and should bring these requests to the notice of the responsible hospital officers or, if necessary, to the Control of Infection Committee, House Committee or Hospital Management Committee. It is desirable to hold sisters' meetings at regular intervals and, at these meetings, problems of hospital infection could be discussed.

*Ward Sister*—The ward sister is responsible for maintaining the ward sepsis register and informing the matron and responsible medical staff. She should draw the attention of the matron or responsible medical staff to any lack of necessary facilities and ensure the strict adherence of all the staff in the ward to the measures recommended for the prevention of infection.

*Hospital Secretary*—The hospital secretary should arrange adequate training and supervision of engineering and maintenance staff, including those operating disinfectors or incinerators, laundry staff, catering staff, and other grades (apart from nursing or domestic).

These functions may be delegated to other officers, e.g., hospital engineer, laundry supervisor or catering officer with assistance from the Control of Infection Officer.

*Control of Infection Committee*—It is recommended that this committee should be composed of :

(a) Clinical members nominated by the Medical Staff Committee, including the Control of Infection Officer and the consultant bacteriologist or hospital pathologist, if one of these is not also the Control of Infection Officer;

(b) the Matron and at least one other senior member of the nursing staff, including a sister tutor if the hospital is a training school for nurses.

(c) The Hospital Secretary.

It is highly desirable that the Medical Officer of Health of the local sanitary district should be represented on this committee.

The Control of Infection Committee should hold regular meetings to review the hospital's sepsis record. Extraordinary meetings should be convened whenever the level of sepsis is giving rise to concern, in order to advise on special measures to be adopted in the face of an outbreak.

*Medical Staff Committee*—The Control of Infection Officer should be a member of the Medical Staff Committee.

*House Committee*—In some hospital groups certain matters relating to control of infection may conveniently be raised at meetings of a House Committee and referred, if necessary, either to the Control of Infection Committee or to the Hospital Management Committee.

*Hospital Management Committee*—Members of a Hospital Management Committee should be aware that staphylococcal infection is an important problem in many hospitals and that outbreaks may occur in spite of precautions that have appeared adequate in the past. The task of hospital officers in maintaning preventive measures is facilitated by understanding on the part of managements of some of the technical difficulties involved. It is particularly desirable to avoid an atmosphere of seeking to lay blame or find scapegoats for any untoward incident. Difficulties can often be traced to inadequate facilities, training or supervision rather than to neglect of duties.

It is part of the function of a Hospital Management Committee to ensure that adequate arrangements are made to control hospital infection. These arrangements should include the setting-up of a Control of Infection Committee and the appointment of a Control of Infection Officer.

*Board of Governors of a teaching hospital*—The remarks contained in the paragraph on the Hospital Management Committee apply also to the Board of Governors of a Teaching Hospital. The presence of medical students creates additional problems in a teaching hospital. It is recommended that instruction in the prevention of infection and the practice of aseptic techniques should be given at an early stage of clinical training. Medical students should be required to conform to the standards expected of other members of the hospital staff. The circumstances in which students attend surgical operations and the accommodation to be provided for them should be considered by the Control of Infection Committee.

*Liaison with outside bodies*—The Control of Infection Officer should exchange information, when indicated, with professional colleagues outside his hospital, namely, the Senior Administrative Medical Officer of the Regional Hospital Board, the Medical Officer of Health, general medical practitioners, either individually or through the Local Medical Committee, the director of the appropriate Public Health Laboratory and medical officers of the Ministry of Health.

Formal communications, when necessary, should be made by the Hospital Management Committee or Board of Governors to the Regional Hospital Board, the Medical Officer of Health or the Local Executive Council. During outbreaks it is essential to keep the Regional Hospital Board informed of progress, with a general statement of the action taken.

The importance of adequate liaison, both within the hospital and outside it, cannot be too strongly emphasised. The control of staphylococcal disease is not merely the province of a particular department of a hospital but one which involves the hospital as a whole and the community in which it is situated. It is not suggesed that any statutory obligation to transfer detailed information should be placed on a hospital authority; any such requirement is superfluous when adequate liaison has been established. It is by the free interchange of significant information, rather than by the obligatory notification of specific items, that genuine co-operation can flourish. The need to be kept informed should be felt as much by hospital authorities as by outside bodies. General practitioners and Medical Officers of Health can assist by informing their hospital colleagues of infections among patients, both before admission and after discharge.

The peculiar difficulties of ascertainment of the incidence of breast abscesses in nursing mothers makes this a subject on which close liaison between hospital authorities, general practitioners and public health departments is particularly desirable. It is suggested that, in order to obtain more reliable statistical information on this matter, voluntary notification of puerperal or postpuerperal staphylococcal disease in mothers and, possibly, infants might be considered as an experiment in a trial area.

### *Appendix I—Rules for Isolation Nursing*

The efficacy of isolation nursing in the prevention of hospital infections depends on :

(a) Adequate accommodation.

(b) Proper facilities for hand-washing and for the disposal of contaminated articles.

(c) Efficient ventilation.

(d) Strict observance of the rules by all members of the staff—nurses, doctors, students, physiotherapists and other ancillary workers.

Isolation nursing is likely to prove most effective where the patients concerned are accommodated in single rooms. On account of the risks from airborne infection it is likely to be less effective where the accommodation consists of cubicles or screened positions

within a multi-bedded ward and least effective where there is no structural separation.

The following rules are intended to apply to patients isolated in single rooms or segregated in multi-bedded wards. The term "isolated area" will be used to denote either a single room or the space around the patient's bed in an open ward.

1. *Windows and ventilators* should normally be kept open.

2. *Doors* should normally be kept closed.

3. *Articles needed by the patient*, or needed for the patient's treatment, should be kept, as far as practicable, within the isolated area. When dressings have to be done, the equipment will usually have to be taken from the general ward stock, but it is important that everything brought out of the isolated area should be disinfected, or sent for destruction, without delay. For this reason dressing trays, if the ward has a steriliser large enough to deal with them, may be preferable to dressing trolleys. Destructible containers should be used for soiled dressings. Care should be taken in the disposal of urine and faeces. Urinals and bedpans should be disinfected without delay.

4. *Gowns* should be provided for each isolation bed and should be worn by the attendants at every examination or treatment of the patient. When not in use they should be hung on hooks within the isolated area. Clean gowns should be issued daily and the used ones removed for laundering and sterilisation.

5. *Masks* should be worn by all attendants on entering an isolated area and discarded on leaving.

6. *Attention to the patient*—Before entering the isolated area the attendant should bare the arms to the elbows and put on a clean mask.

Immediately after entering the isolated area the attendant should put on one of the gowns kept there, then wash the hands in soap and water and dry them.

After attending to the patient the attendant should remove the gown, hang it on the hook provided for it and again wash the hands. The mask should then be removed and discarded, care being taken to handle only the tapes.

7. *Patient's notes*—The patient's notes and charts should be kept outside the isolated area.

8. *Cleaning*—A gown reserved for the use of the ward maid should be among those kept within the isolated area. Essential cleaning equipment should also be kept within the isolated area. Dusters should be damped with disinfectant solution before use and boiled after use. The floor should preferably be washed. The alternative to washing is damp-sweeping with a broom kept within the isolated area. (Oiled floors should be swept with dry brushes of medium hardness).

9. *Terminal disinfection*—After the patient's discharge all non-expendable articles within the isolated area, including the bed-linen, blankets, mattresses, pillows and cleaning equipment should be disinfected. The bed and other furniture, the floor and walls should be wiped with disinfectant solution and thoroughly cleansed.

### *Appendix II—Rules for the Performance of Wound Dressings*

*General*—The rules must be followed for both clean and infected wounds. When dressings are carried out in the ward, dusting, sweeping, bedmaking and unnecessary traffic should cease, and bed-curtains should be drawn, 15 minutes before wound dressings are begun. Only one wound should be uncovered at a time.

Dressings may be performed by one person working alone, or by a team of two persons (dresser and assistant). The latter has the advantage that the dressing trolley does not have to be set anew for each patient, although it ought to be reset after the dressing of a septic wound.

*Rules for a single dresser*—1. Wash the hands thoroughly and dry them on a clean towel.

2. Prepare dressing trolley, either using pre-packed complete dressing kits or collecting into dishes the necessary sterile forceps, scissors, dressings and lotions from the stock drums, etc.

3. Proceed to the bedside. Adjust the patient and the bedclothes. Remove the outer dressings, but leave the innermost dressing in place. Soiled material should be placed directly into a container in which it can be taken for sterilisation or destruction.

4. Wash and dry the hands.

5. Carry out the dressing, using a strict no-touch technique. It may be useful to have a sterile towel available to place on the bed as a resting place for material. Cover and bandage the wound.

6. Adjust the bedclothes.

7. Discard surplus clean material for re-sterilisation. Place instruments and bowels in steriliser. Mop trolley-top with disinfectant.

8. Wash and dry hands.

*Rules for a two-person team*—The team comprises a 'dresser' who takes off the bandages and dressings, and attends to the toilet of the wounds, and an 'assistant' whose sole duty is to look after the trolley and pass clean things to the dresser.

| Dresser | Assistant |
|---|---|
| 1. Wash and dry hands. | Wash and dry hands. |
| 2. Arrange patient and bedclothing; take off and discard outer dressings. | Collect necessary material from dressing kit or drums, bottles, etc.<br>Prepare moistened swabs as needed. |
| 3. Wash and dry hands. | |
| 4. Remove and discard inner dressing. Carry out wound toilet, using sterile forceps and strict no-touch technique. | Supply dresser with all sterile material, using long-handled forceps (kept in disinfectant when not in use) which must never touch non-sterile material. |
| 5. Discard forceps and any contaminated material for re-sterilisation. | In the case of a dressing on a septic wound, discard any surplus clean material on trolley top for re-sterilisation. |
| 6. Wash and dry hands. | |

*Dressing rooms*—Either of the two routines described may be used. In busy out-patient or casualty dressing rooms it may be possible for one trolley assistant to supply two dressers.

*Appendix III—Operating Theatre Practices*

This Appendix does not describe operating theatre customs, such as the wearing of sterile gowns and gloves, that are already accepted and universally practised. It is not, therefore, a complete guide to theatre practice and discipline. Its purpose is to re-assert the importance of valuable practices that are sometimes overlooked and to mention others whose importance has been emphasised by recent work.

Most of the suggestions made here are intended to reduce the number of airborne organisms in the theatre during an operation. If they are meticulously applied they will achieve this object. They are intended to apply to staff working in sterilising rooms as well as those in the actual operating room.

1. The theatre nursing staff should become as permanent a team as possible. Changes of staff for training purposes are essential but changes for the other reasons should be avoided. It is particularly undesirable to supplement the theatre staff for each operation with a nurse from the patient's own ward.

2. During an operation there should be no more people in the theatre than is necessary. It is impossible to specify here a maximum safe number. A properly ventilated theatre can safely accommodate more people than one with a primitive ventilation system.

3. Some people are prolific dispersers of organisms from the skin and bathing temporarily reduces this dispersal. Ideally every member of the surgical and nursing team should bathe before each operating session but this may not often be practicable. Theatre units should be provided with showers or baths.

4. All persons who will be in the theatre during an operation should remove their outer clothes or uniform and put on freshly laundered cotton shirts and trousers, or frocks, and canvas or rubber shoes. This rule should apply to students, visitors, radiographers and other occasional staff as well as to regular members of the theatre team.

5. Everyone in the theatre should wear a cap covering the hair and a mask over the nose and mouth. Even though a mask may allow contaminated particles to escape round the sides, it does prevent large droplets of saliva from being projected into the wound or on to sterile equipment during speech.

6. Woollen blankets should not be taken into the theatre. In a well-heated theatre suite a sheet may be sufficient covering for the patient; but if extra warmth is needed a freshly laundered Turkish towelling blanket may be used.

7. The patient should be lifted on to the table and got into position for operation outside the theatre. This can usually be done in the anaesthetic room. The table is then pushed into the theatre with a minimum of fuss. After the operation the transfer from table to trolley or bed should be made outside the theatre. As well as reducing disturbance, this procedure renders the presence of a porter in the theatre unnecessary.

8. During the operation, movement in the theatre should be reduced to a minimum. A nurse crossing the room raises a cloud of airborne organisms and some of these may land in the wound or on sterile equipment. Nurses and orderlies often wander about when temporarily unoccupied; this can be discouraged by providing seats for them.

9. No one should enter or leave the theatre—still less the theatre suite—during an operation except for a very exceptional emergency. Often, up to 50 journeys are made between theatre and sterilising room during an operation. The equipment carried on these journeys should be got ready in the theatre before the operation starts. Special journeys should not be made to take out used quipment before the operation is completed. These changes of routine often reduce the number of unscrubbed nurses needed in the theatre during an operation.

10. Talking should be reduced to the necessary minimum.

## NOTES AND NEWS

### Eradication of Malaria in India

The World Health Organisation's assistance to India for the Malaria eradication programme in 1960 is tentatively estimated at $204,000. This amount may be increased later to help the country make up for the shortfall of performance in 1958-59.

The Director-General of WHO says, in the course of a report on malaria eradication, "that in some Indian States there have been periods of delay in the actual implementation of the eradication programme due in most instances, to late receipt of budgetary allotment."

"The Indian programme," says the Director-General, "is receiving very considerable support from the U. S. International Co-operation Administration to the extent of about $10-12 million annually. UNICEF has provided equipment for a DDT plant.

"The aid given by WHO to the malaria eradication programme in India comprised in 1958 about $1·5 million worth DDT to meet a shortfall. Other items of assistance included a grant to the Malaria Institute of India. In 1959 the amount budgeted for India was $300,000."

The Director-General reported that in urban areas of some States in India, which had been under spraying for a number of years, there was a certain number of refusals to let houses be sprayed but this trend, as also some refusal by religious groups, was now being countered by a public health education campaign.

### UNICEF Aid to India's Health Services Development

Economic aid totalling 2,238,000 dollars to India for four Government health programmes was recommended on August 15, 1959 by Mr. Maurice Pate, Executive Director of the United Nations Children's Fund (UNICEF).

A statement issued by UNICEF said that India had been the chief beneficiary of the Fund's assistance during the last 11 years and nearly 25 million dollars in aid had

11 VITAMINS

DROPS

INJECTION

10 VITAMINS

MULTIVITAMINS

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12 VITAMINS
+
6 MINERALS

TABLETS

| | DROPS *Each ml. supplies* | INJECTION *Each ml. supplies* | TABLETS *Each tablet supplies* |
|---|---|---|---|
| Vitamin A | 8000 I. U. | 5000 I. U. | 4000 I. U. |
| Vitamin D | 1600 I. U. | 500 I. U. | 400 I. U. |
| Vitamin E | 0.1 mg. | 1.25 mg. | 1 mg. |
| Vitamin $B_1$ | 2 mg. | 5 mg. | 4 mg. |
| Vitamin $B_2$ | 1 mg. | 1 mg. | 2 mg. |
| Vitamin $B_6$ | 0.5 mg. | 1.5 mg. | 2 mg. |
| Vitamin $B_{12}$ | — | — | 2 mcg. |
| Panthenol | 4 mg. | 2 mg. | 4 mg.(Cal.Pantothenate) |
| Nicotinamide | 50 mg. | 12.5 mg. | 10 mg. |
| Choline Dihydrogen Citrate | 2 mg. | 7.5 mg | 2.5 mg. |
| Vitamin C | 80 mg. | 25 mg. | 30 mg. |
| Methionine | 5 mg. | — | — |
| Folic Acid | — | — | 0.15 mg. |
| | | | and Iron 3.34 mg. |
| | | | Calcium 70 mg. |
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| Vitamin $B_{12}$ | (cyanocobalamin) | 12 mcg. |
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been approved for various projects, concerned mainly with improving the health and welfare of mothers and children.

The largest single sum out of the present allocation is for expanding a national programme for the development of health services in relation to community development with special emphasis on basic maternal and child welfare training.

UNICEF would provide clinical and other equipment for 25 hospitals, 10 laboratories, 126 main health centres, and sub-centres, 144 vehicles, 3,126 midwife and public health nursing kits; drugs and diet supplements, equipment for health education and stipends for trainees.

Another recommendation is for the provision of equipment for milk collecting centres, processing, bottling and cold storage equipment for a dairy in Bangalore City.

The dairy will process 50,000 litres of milk a day and will be capable of expansion to produce 150,000 litres daily as part of a national plan for dairy development under which the Government of India is seeking to stimulate rural milk production and to ensure improved and enlarged supplies for its major cities.

A third recommendation is for additional equipment for a milk conservation project in the city of Ahmedabad in Bombay State.

Fourth allocation would be for supplies and equipment for a three-year nutrition project in Andhra Pradesh. UNICEF would provide equipment for poultry development in 200 villages. It would also provide fish culture for 200 village tanks.

### WHO's South-East Asia Conference

Dr. U. Krishna Rao, Speaker of the Madras Legislative Assembly, has been invited by the World Medical Association to be an Observer at the South-East Asia Conference of the World Health Organisation to be held in Kandy (Ceylon) from September 23 to 29.

### Oxygen Kills Viruses

An interesting paper on the effect of oxygen upon the vitality of viruses was reported at the 12th session of the Institute of Virology under the USSR Academy of Medical Sciences, recently held in Moscow. Two scientists from Leningard—Professor. A. Panov and a senior scientific worker P. Remezov—studied this problem. By experimenting on animals, the scientists found that oxygen under pressure brought about sharp changes in cell metabolism. A virus is known to parasitise within the cell. Oxygen changes sharply the oxidising processes in the cell, thus placing the virus in conditions that are unfavourable for its existence. Experimental mice were given lethal doses of viruses. Usually such doses caused serious disorders of the nervous system. Nevertheless, 50 to 70 per cent of the animals, being placed for a certain time into a chamber filled with oxygen under the pressure of 1 atmosphere, remained alive and the examination of their organs showed the disease to have stopped developing and the virus to have disappeared.

The experiments conducted by Professor Panov permit one to hope that the further elaboration of this method for treating different viral disorders will result in finding successful means of treating man, as well.

### International Congress of Haematology

The 8th International Congress of Haematology jointly organised by the International Society of Haematology and the Science Council of Japan will be held in Tokyo on September 4-10, 1960. The main subjects of the Scientific Sessions will be (1) Nucleonics, (2) Leukaemia, (3) Haemocytology, (4) Anaemia, (5) Coagulation and Haemorrhagic disorders, (6) Immunohaematology. The working languages of the Congress will be English, French and Japanese. Further information regarding the congress may be obtained from the Secretary, Organising Committee, 8th International Congress of Haematology, Science Council of Japan, Ueno Park, Taito-ku, Tokyo, Japan.

### All-India Paediatric Conference

The 11th All-India Paediatric Conference will be held at Bombay from the 6th to 8th December, 1959. Dr. J. K. G. Webb, President, Indian Paediatric Society, will preside.

The programme will include symposia on the following subjects: (A) 1. Disorders of liver in children. 2. Institution of paediatric training courses in the universities and creation of training facilities in the medical colleges. 3. Poliomyelitis in children. (B) Original papers to be presented by paediatricians and members of the medical and allied professions interested in paediatrics from all over the country as well as foreign delegates on various aspects of child health.

Those desirous of presentnig papers are requested to notify the Hony. Secretary, Indian Paediatric Society, 95, Dilkhusa Street, Calcutta 17, immediately. Abstracts of all papers must reach the Secretary of the Society by the 31st October, 1959. Enquiries regarding accommodation and other local facilities should be addressed to the Secretary, Reception Committee, "Roxona", 109, Queens Road, Bombay 1. Railway concession will be available to persons attending the Conference.

### Sub-Committee for Health Plans

The Health Survey and Planning Committee met in Delhi on August 12, 1959 for its first business session. Dr. A. Lakshmanaswamy Mudaliar presided. Earlier, it was inaugurated by the Union Minister of Health, Mr. D. P. Karmarkar.

The committee has set up six sub-committees to deal with various aspects of health survey and planning. These sub-committees will cover the entire range of health activities.

### Manufacture of Optical Glass

The Central Glass and Ceramic Institute of the Government of India has evolved a new process for the manufacture of optical glass, Mr. Manubhai Shah, Minister of Industry, said in reply to a question in Lok Sabha. A plant for the manufacture of optical glass by this

process would be installed in the proposed factory at Durgapur, or at Calcutta.

### Training in Demography

The Demographic Advisory Committee has recommended that training facilities in demography should be made available in some selected universities.

The committee has further suggested that programmes for the collection of information on attitudes towards family planning should be initiated immediately at various research centres. This information will be of use in educative programmes and later in assessing changes in attitude brought about by the family planning programme.

Investigation of socio-economic factors affecting fertility, like rural and urban migration, and evaluation of the family planning programme in areas where it has been introduced have also been urged by the committee.

The committee noted that there was a possibility of the demographic training and research centre in Bombay raising the number of trainees to be taken from India. The centre is being run in association with the United Nations.

It was agreed that the next meeting of the committee should be held in Bombay to consider co-ordination of training programmes, fellowships for research training, development of co-ordination in research and the programme to be undertaken during the next five years, possibility of arranging university extension lectures, building up of a central library, publication of a journal and the opening of a training centre in the Delhi University.

### Survey of Tuberculosis Patients

The Delhi Corporation proposed to conduct a survey of all the localities and streets of Delhi in order to ascertain the number of tuberculous patients and their condition.

It was proposed to conduct such a survey with the help of the Union Government. The survey, if approved, would lead to the adoption of suitable arrangements for checking the disease, treatment of patients and their segregation from the rest of the population. The councillors felt that although modern methods had been discovered to combat tuberculosis and the death rate had come down, yet there was an increase in the incidence of the disease in Delhi.

### More Hospitals for Himachal

Mr. Bajrang Bahadur, Lt.-Governor of Himachal Pradesh, disclosed that Rs. 80 lakhs would be spent on medical and public health during the second Plan period as against Rs. 20 lakhs during the first Plan.

The Lt.-Governor, who was opening a new building of the Solan Hospital, built at cost of Rs. 2,00,000, said another Rs. 7,00,000 would be spent for enlarging medical facilities in the hospital and the number of beds would be raised from 40 to 75.

He announced that there would be two more hospitals in Mahasu district, at Rampur and Solan, to serve the needs of the area.

At present there were 160 hospitals and dispensaries in Himachal Pradesh as against 91 in 1952. The total number of beds had increased from 250 in 1948 to 1,377.

### Health Check-up Centre For Government Servants

A health check-up centre under the auspices of the Contributory Health Service scheme for Government servants was opened at the Central Secretariat dispensary by Dr. A. Lakshmanaswamy Mudaliar, Vice-Chancellor of Madras University, recently.

Dr. D. P. Karmarkar, Union Health Minister, who presided over the function, said that it was for the first time that such a scheme was being introduced in the country. In India people were not habituated to such check-ups and the Government wanted to develop this habit among them. The check-up at the centre would be free of charge.

Dr. Mudaliar said that prevention of illness was a better method than cure later. Such health check-ups were common in the West.

### Maternity Home for Ahmedabad

The Governor Mr. Sri Prakasa, opened a Rs. 3-lakh maternity home and hospital established by the Municipal Corporation in a semi-rural suburb of Ahmedabad on 23-8-59.

Mr. Sri Prakasa welcomed the extension of the latest facilities especially to the rural and working classes. Nevertheless, he asked doctors to spread the message of family planning. At the rate at which India's population was growing, he said, there might not be "enough standing room" for us a few years hence.

The Governor said that the extent of facilities available for the treatment of women and children was a measure of a country's social progress.

## CORRESPONDENCE

*The Editor is not responsible for views expressed by correspondents*

### B. C. G. Vaccination

Sir,—I find that you have mentioned about the article published in the *British Medical Journal* of the 6th June by 17 doctors in America expressing "grave doubts" regarding the efficacy of the B. C. G. Vaccination in your columns (*J. Indian M. A.*, **33** : 160, 1959) under Notes and News. It is, of course, quite in order to refer to scientific papers in a medical journal but especially in view of the fact that India has got a National BCG Vaccination Programme going on in full swing for the last ten years, one would have thought that you would also in fairness mention about the Journal's leading article expressing a different view in the same *British Medical Journal* on the subject, not to speak about mentioning two other articles in the same Journal in favour of BCG.

I would like to further point out that no new facts have been brought up to cast doubts on the efficacy of the BCG Vaccination in the article that appeared under the name of 17 medical officers. Dr. Myers of Minnesota, as you know, has been a violent critic of BCG for a long time and you would have noticed that most of these 17 doctors are his associates coming from the same place. I am not mentioning this fact to detract from the value of the opinions of the eminent doctors but only to point out that this is a case of old wine in a new bottle. I am etc.

P. Mohamed Ali,
M.B.E., M.B.B.S., D.P.H.
B. C. G. Officer to Government of India.

3, Red Cross Road,
New Delhi 2.

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Publication of a news item does neither indicate our endorsement nor disapproval of the view expressed therein. Neither does such publication necessarily require to be followed by opposite or divergent views at the same time as has been suggested by the correspondent. That incidentally applies to a review article. It is customary to refer to substantiated statements in a scientific journal, for whatever they are worth, without prejudicing a particular school of thought.—ED., *J. Indian M. A.*

## REVIEWS

**Our Food**—By M. Swaminathan, D.Sc., and R. K. Bhagavan, B.Sc., M.B.B.S., D.T.M. & H. (ENG.); 1959 Ganesh & Co. (Madras) Private Ltd., Madras; 7¼" × 5"; Pp. viii+88; price Re. 1·50.

In this small book the authors have presented in simple language an uptodate account of the recent advances in the field of food and nutrition. They have discussed the food problems of the country as well, and indicated how the available resources can best be utilised for the maintenance of health of the people.

This publication will not only serve as a manual of reference to social workers, health visitors, dietitians but will also be a general guide to all persons interested in spreading knowledge of food and nutrition. It contains information which even the common man can grasp and utilise in his day-to-day life. It deserves a place in every home.

**The Biochemistry of Clinical Medicine**—By W. S. Hoffman, PH.D., F.A.C.P. Second edition, 1959; The Year Book Publishers, Inc.; 6¼" × 9½"; pp. xxi+734; price $12·00.

The book has dealt exhaustively with the physiological principles involved in a variety of pathological conditions. The background of the book is based on fundamental biochemical angle and the changes occurring on biochemical level in a variety of clinical conditions are clearly explained with valuable data. With a general background of physiology and chemistry the physician will be able to follow the book and it will help him in diagnosis, treatment, and prognosis of a patient.

Some of the topics like serum proteins, oxidation of fatty acids, serum lipoprotein, blood clotting, porphyrin metabolism, potassium and bilirubin metabolism, thyroid and adrenal hormones, are written very lucidly and will create interest in the reader's mind. The book can be recommended to every teaching and practising physician.

**The Mother and Child**—By Mary Charyan, M.B.B.S., D.M.C.W.; The Christian Medical Association of India, Nagpur, 1959; 7¼" × 5"; pp. 159; price Rs. 2·50.

This small book written in a simple and elegant style will serve as a valuable guide to young parents anxious for knowledge in the art of child care. In twentyfive chapters, the author has made useful suggestions as to how to deal with the child from the time of conception to the school age. As the mother's health, during pregnancy and after, is of very great importance in rearing up the child, maternal care has also been discussed. The book contains good many illustrations explaining the points the author wanted to impress on the readers. From the beginning to end, it contains information which every mother should know in the best interest of the child and herself and as such it should have a place in the home of every prospective parent.

**Cell and Tissue Culture**—By J. Paul. 1959, E. & S. Livingstone Ltd., Edinburgh and London; 5½" × 8½"; pp. 261; price 30s. net.

All pursuers of tissue culture technique would find this book highly useful. In addition, however, to detailing the techniques, the author has outlined the theoretical background, as well as application of the technique for morphological, metabolic, and virological studies. Thus the book has both scientific and technical value. The large number of illustrations, some of which are in colour, and the extensive bibliography at the end of each chapter, add to the worth of the book.

**A Method of Anatomy**—By J. C. Boilen Grant. Sixth edition, 1958, Bailliere Tindall & Cox Ltd., London. 6¼" × 9½"; pp. xxv+879; price 88s. net.

The text has been thoroughly revised with the utmost critical literary care. Much new material has been added to the chapters on joints, neurovascular hila of muscles, electromyography, foot, liver, the lymphatic system, the teeth and the time of fusion of epiphyses. The functional aspects of the structures have been dealt with in their proper places. Reference to comparative anatomy and to embryology, particularly in the chapter on viscera, has made the subject matter more interesting. Several new instructive line drawings of artistic skill have been added.

The new International Anatomical Nomenclature has been chiefly adopted, but where gross difference of terminologies exists, the B. N. A. and its Birmingham re-

vision of previous editions have been conveniently inserted in brackets to avoid confusion.

The approach to the subject decidedly involves certain departures from tradition, enabling the students to learn the infinite complexities of the subject in a much easier way.

The singular clarity and the lucid description with which the instructions and the guidance have been dealt with in the text, are sure to gain popularity amongst students of anatomy.

Regarding neurology, a chapter on the central nervous system, added to the text, would have been greatly appreciated.

**Pictorial Handbook of Fracture Treatment**—E. L. Compere, S. W. Banks and C. L. Compere. 4th edition, 1958; The Year Book Publishers, Inc., Chicago, Ill., U.S.A.; 5½"×8", pp. 448; price $7·50.

Since its first publication in 1943, the book has gone through several reprintings and new editions thus indicating its popularity amongst practitioners and students. Of the 435 text pages, the book deals with general considerations on treatment of fractures and dislocations in 127 pages, the groundwork that is essential for a beginner. It covers most of the material required by an under-graduate and deals with methods generally accepted even in controversial subjects like supracondylar fracture with oedema and obliquity of fracture ends, condylar fractures of the upper tibia (smashed upper end) and calcaneal fractures, etc.

Much of the material is written almost in basic English and the illustrations are superb. The book may be strongly recommended for under-graduates and general practitioners for whom it is intended.

## OBITUARY

### Dr. B. N. Banerji

Born on September 20, 1900 at Mahesh in Bengal, Dr. Bhupendra Nath Banerji graduated in Science from the Patna University in 1920, securing the first place with Honours in Chemistry. In the Medical College, Calcutta, he had an uniformly brilliant career. He obtained the Duke of Edinburgh prize in Clinical Surgery, gold medals in Surgery and Pathology and finally gold medal for topping the list in the M.B. Examination of Calcutta University in 1926. After graduation he joined Indian Research Fund Association as a research assistant to late Col. A. N. Bose, F.R.C.S. (LOND.) and did very promising researches in typhoid fever and ascites. In 1927 he was appointed as Demonstrator of Physiology at P. W. Medical College, Patna, and in 1930 was selected by the Government of Bihar as Lecturer in Chemical Pathology in the same institution. He went to U.K. in June 1936 and was admitted F.R.C.S. (ENG.) in December 1937.

On his return, he was transferred as teacher in Surgery at Darbhanga Medical School, where he became

DR. B. N. BANERJI.

the Professor of Surgery in 1946 when the School was upgraded. In 1952 he was appointed Principal at Darbhanga Medical College, a post that he held with conspicuous ability till he came to Dibrugarh as Principal and Professor of Surgery of the Assam Medical College in 1956. He served the various Bodies of Patna and Bihar Universities as a member of the Syndicate, Academic Council and Faculty of Medicine and as Dean of Medical Faculty of Bihar University till 1956. He was a member of the Executive Committee of the Indian Medical Council and the Assam Medical Council. He was Dean of the Medical Faculty of the Gauhati University and took initiative in introducing and organising the post-graduate medical course in the State. He was examiner in M.B.B.S. and M.S. examinations of most of the Indian universities.

In research, his contribution to the understanding of the pathology of volvulus was highly appreciated in the West and mentioned in text books.

He was the President of Indian Medical Association, Dibrugarh Branch, and was also the Chairman of the Reception Committee, 9th Session of the Assam Medical Conference held at Dibrugarh in November, 1958. By his devotion to duty, amiable and affectionate nature, and surgical skill, Dr. Banerji conquered the heart of his pupils, patients, friends, colleagues and the public in general.

On the 11th August, 1959 at 9-30 P.M. Dr. Banerji had a sudden attack of coronary thrombosis and he passed away on the 14th August, 1959 at 5-35 P.M. in his official residence in the campus of the Assam Medical College.

# SUPPLEMENT
## Journal of the Indian Medical Association

VOL. 33, No. 6 CALCUTTA SEPTEMBER 16, 1959


## XXXVI ALL-INDIA MEDICAL CONFERENCE INDORE, DECEMBER, 1959

The Organising Secretary, 36th All-India Medical Conference has issued the following :

The 36th All-India Medical Conference will be held at Indore in the last week of December, 1959.

Indore, the pink and gay city of Madhya Pradesh occupies an eminent place in the history of Malav-Desh, now known as Malwa, a territory reputed as a repository of Indian culture. It is also the recognised industrial and commercial capital of the State. Its climate is pleasing and salubrious.

The conference will be attended by the celebrities of the medical world, representatives of the States and also of foreign governments and about 2000 delegates from every nook and corner of this country.

To commemorate this occasion, a Souvenir will be brought out. It will contain articles by eminent persons and more than 3000 copies will be printed. As such it will be an excellent medium of advertisement to be availed of by the manufacturers and traders of medicine and medical appliances.

The Souvenir will be 10" x 7" in size and will be printed in the best art paper available. The rates of advertisement in the Souvenir are :

| | | |
|---|---|---|
| Back Cover full page | ... | Rs. 500 |
| Inside Cover full page | ... | ,, 450 |
| Full page suitable place | ... | ,, 350 |
| Ordinary full page facing reading matter | ... | ,, 300 |
| Ordinary full page back side | ... | ,, 250 |
| Ordinary half page facing reading matter | ... | ,, 175 |
| Ordinary half page back side | ... | ,, 150 |
| Ordinary quarter page facing reading matter | | ,, 95 |
| Ordinary quarter page back side | ... | ,, 85 |

OTHER INFORMATION

| | | |
|---|---|---|
| Over-all size of the paper | ... | 8½" x 10½" |
| Printed area | ... | 7" x 9" |
| Measurement of block | ... | 6½" x 8½" |

Alternative choice for printing may kindly be intimated to save delay in correspondence.

A Scientific and Industrial Exhibition will also be held. It will be located in the Campus of the M. G. M. Medical College. This exhibition will afford a very good opportunity to the manufacturers of medical products, to display their manufactures before the medical men attending the conference.

The Exhibition is open to all pharmaceutical concerns, dealers in surgical instruments, hospital equipment, x-ray appliances, microscopes and those making models, scientific charts, and sanitary installations etc. The Exhibition site will be situated very close to the Conference Pandal inside the College campus. The stalls will be arranged likewise Rents of the Stalls are as follows :

Ordinary Stall size 12' x 12'

| | | |
|---|---|---|
| Nos. 1—33 | ... | Rs. 350 each |
| ,, 34—69 | ... | Rs. 300 each |
| ,, 70—113 | ... | Rs. 250 each |
| The rest and corner blocks viz., 25, 70, 98, 117 and 123 | ... | on enquiry |
| Space for advertisement on either side of the gate | ... | on enquiry |
| Pavilions Nos. 1—10 | ... | on enquiry |

TERMS :

1. Allotment of space for ordinary advertisement and stalls will be made in order of priority of applications as far as possible.

2. All communications regarding reservation of stalls and space for advertisement shall be addressed to Dr. R. A. Bhagwat, Hony. Organising Secretary, XXXVI All-India Medical Conference, 54, Bohara Bazar, Indore City, M.P.

Last date of application for reservations is as follows :

(1) Advertisement ... 1st October, 1959
(2) Stalls ... 1st November, 1959

3. Charges for ordinary stalls and advertisements, shall be payable in advance along with the application, either by M.O. or Crossed cheque endorsed to the Honorary Organising Secretary, XXXVI All-India Medical Conference, Indore City, M.P.

4. The Souvenir and Exhibition Sub-Committee's decision on all matters will be final and the Sub-Committee reserves the right to accept or reject any advertisement. Alternative choice may kindly be intimated to save delay in correspondence.

5. Stall decorations and furnishing will have to be made by the stallholders at their own cost.

6. Minimum light points necessary for each stall will be provided by the Sub-Committee. Additional lighting arrangements, if required, will have to be undertaken by the exhibitors through approved contractors.

7. Limited boarding and lodging arrangements on payment will be made available by the Sub-Committee for the exhibitors, if such requests are received along with the application, well in advance.

8. Each stallholder and advertiser in the Souvenir will receive a copy of the Souvenir and other publications, free of cost. Any extra copy may be obtained by paying the cost price, if sufficient notice is given to the Sub-Committee.

## I.M.A. STUDY TOUR TO EUROPE, AUGUST/OCTOBER, 1959

The following sixty doctors left for Europe on 22-8-59 on a study tour organised by the Indian Medical Association. They will visit Italy, Austria, Switzerland, West Germany, France, Belgium, the Netherlands, U.K. and Denmark. This is the second tour of its kind, the first having been organised in 1956.

1. Dr. Prakash C. Bhatla (*Leader*), Delhi.
2. Dr. A. Bapi Raju (*Deputy Leader*), Visakapatnam (Andhra).

3. Dr. V. Balakrishna Row, Visakapatnam (Andhra).
4. Dr. V. V. Chetty, Visakapatnam (Andhra).
5. Dr. K. Krishnamurty, Chodavaram (Andhra).
6. Dr. (Mrs.) S. Rama Rao, Vijayawada (Andhra).
7. Dr. D. Viswanadham, Visakapatnam (Andhra).
8. Dr. D. K. Dutta, Dibrugarh (Assam).
9. Dr. R. Bhuyan, Digboi (Assam).
10. Dr. B. Dalal, Jamshedpur (Bihar).
11. Dr. Shanker K. Aiyer, Bombay.
12. Dr. Y. G. Benkar, Bombay.
13. Dr. (Mrs.) L. Y. Benkar, Bombay.
14. Dr. (Mrs.) S. R. Chury, Bombay.
15. Dr. M. V. Hindlekar, Bombay.
16. Dr. (Mrs.) C. M. Hindlekar, Bombay.
17. Dr. C. B. Mehta, Bombay.
18. Dr. (Mrs.) P. S. Pai, Bombay.
19. Dr. R. R. Pai, Bombay.
20. Dr. E. C. Patel, Bombay.
21. Dr. (Mrs.) T. J. Paymaster, Bombay.
22. Dr. (Mrs.) U. T. Rao, Bombay.
23. Dr. C. M. Vakil, Bombay.
24. Dr. Gopal D. Bendale, Jalgaon (Bombay State).
25. Dr S. L. Dhami, Murtizapur (Bombay State).
26. Dr. V. P. Gupte, Nasik City (Bombay State).
27. Dr. M. G. Hajirnis, Thana (Bombay State).
28. Dr. H. S. Joshi, Nasik City (Bombay State).
29. Dr. (Mrs.) I. H. Joshi, Nasik City (Bombay State).
30. Dr. D. G. Kane, Nandurbar (Bombay State).
31. Dr. B. B. Kirtane, Dhulia (Bombay State).
32. Dr. R. M. Kotasthane, Thana (Bombay State).
33. Dr. V. R. Patil, Karad (Bombay State).
34. Dr. V. B. Rege, Padgha (Bombay State).
35. Dr. Jnanranjan Banerjee, Calcutta.
36. Dr. Hirendra G. Das, Calcutta.
37. Dr. Prem Narain, Delhi.
38. Dr. Thakoreprasad Bhatt, Ahmedabad (Gujarat & Saurashtra).
39. Dr. S. B. Lal Mittal, Rajpura (Gujarat & Saurashtra).
40. Dr. S. B. Pathakji, Surat (Gujarat & Saurashtra).
41. Dr. H. A. Shah, Dhansura (Gujarat & Saurashtra).
42. Dr. Mohanlal B. Shah, Dhansura (Gujarat & Saurashtra)
43. Dr. R. J. Upadhya, Surat (Gujarat & Saurashtra).
44. Dr. R. B. Vacchrajani, Jetpur (Gujarat & Saurashtra).
45. Dr. C. Ojha, Indore (Madhya Pradesh).
46. Dr. V. K. Ketkar, Gwalior (Madhya Pradesh).
47. Dr. M. K. Mukherji Jabalpur (Madhya Pradesh).
48. Dr. A. Arumugam, Karur (Madras).
49. Dr. T. M. A. Pai, Manipal (Madras).
50. Dr. C. Ranganathan, Madras.
51. Dr. V. P. Alexander, Karad (Maharashtra).
52. Dr. T. K. I. Dayalu, Bangalore (Mysore).
53. Dr. B. K. Hedge, Hassan (Mysore).
54. Dr. D. R. Prasad, Mysore.
55. Dr. (Mrs.) A. Prasad, Mysore.
56. Dr. D. Kameswar Rao Jeypore (Orissa).
57. Dr. A. M. Farooqi, Sitapur (U.P.).
58. Dr. G. Goel, Mathura (U.P.).
59. Dr. (Maj. Gen.) P. P. Chowdry, Burnpur (West Bengal).
60. Capt. Dinanath Chatterji, Konnagore (West Bengal).

## BRANCH NOTES

**ALIGARH BRANCH**—A meeting of the branch was held on 30-7-59. Fourteen members were present. Office-bearers for 1959-60 were elected with Dr. P. R. Suri as president, Dr. R. K. Maheshwari as vice-president, Dr. S. M. Lalla as secretary, Dr. M. T. Khan as joint secretary and Dr. Hafeezur Rehman as auditor. Circulars of the State Branch were read and recorded.

**ANDHRA PRADESH STATE BRANCH**—At the Working Committee Meeting of the State Branch held on 23rd August 1959 as per the Circular of the Central Office the following standing committees were formed.

1. National Plan Standing Committee : Members : 1. Dr. D. Rajasekhara Rao, Eluru, 2. Dr. K. N. Waghray, Hyderabad, 3. Dr. K. Vishwanadha Rao, Vizag, with President and Secretary of the Pradesh Branch as ex-officio members.

2. Medical Education Committee : Members : 1. Dr. P. Manikya Razu, Hyderabad, 2. Dr. T. Kanaka Raju, Tirupathi, 3. Dr P. Srinivasa Reddy, Kurnool, with President and Secretary of the Pradesh Branch as ex-officio members and Secretary as convener.

3. Finance Standing Committee : Members : 1. Dr. M. Y. Mirza, Hyderabad, 2. Dr. W. Narasingh Rao, Secunderabad, 3. Dr. A. V. Ramamurthy, Hyderabad, convener, with President and Secretary of the Pradesh Branch as ex-officio members.

4. Family Planning Standing Committeee : Members : 1. Dr. P. S. Giri, Bezwada, 2. Dr. M. Y. Mirza, Hyderabad (Convener), 3. Dr. D. Rajasekhara Rao, Eluru, 4. Dr. A. V. Ramamurthy, Hyderabad, with President and Secretary of the Pradesh Branch as ex-officio members.

5. Insurance Standing Committee : Members : 1. Dr. D. V. Bopardikar, Hyderabad, 2. Dr. J. V. R. Sarma, Hyderabad (Convener), 3. Dr. M. Seshacharyulu, Masulipatam, with president and secretary of the Pradesh Branch as ex-officio members.

**BELGAUM BRANCH**—The monthly clinical meeting of the branch was held on 28-7-59. Dr. S. W. Khot presided. Dr. Metgud gave a talk on Habits and Customs on the Prevalence of Diseases. Thirty-five members attended the meeting.

**BOMBAY TERRITORIAL BRANCH**—The council of the branch held a meeting on 2-8-59 to wish Bon Voyage to Dr. R. V. Sathe, Immediate Past President of the Territorial branch, Dr. R. K. Menda, vice-president of the Territorial branch, Dr. C. L. Jhaveri, president, Bombay branch, going to attend the II World Conference on Medical Education to be held at Chicago, and the XIII General Assembly of WMA at Montreal, Canada. Dr. N. N. Kailas, Dy. Minister for Health, Government of Bombay, who attended the meeting as the Chief Guest, offered his good wishes to the members proceeding abroad. Dr. R. V. Sathe thanked Dr. Kailas for attending the meeting as also the members.

A tea party was held on 22-8-59 to wish a happy journey to the participants of the Second Europe Tour of I.M.A. A message from Dr. C. O. Karunakaran, President, I.M.A., wishing the members a happy voyage was read. Dr. P. C. Bhatla, the leader of the party, was garlanded.

**CHALISGAON BRANCH**—A special meeting of the branch was held on 29-8-59. Dr. Purnapatre presided. Films on (1) Malnutrition, (2) Antitubercular Drugs and (3) Resuscitation of Cardiac Arrest were shown.

**COIMBATORE DISTRICT BRANCH**—A monthly meeting of the branch was held on 25-7-59. Dr. D. Sundareswaran presided. Dr. T. V. Sivanandam announced the presentation of a Speaker's Stand by Dr. C. S. Ramaswamy Iyer which was gratefully acknowledged. Dr. G. S. Krishnamurthy spoke on Carcinoma of the Colon and Rectum followed by slide exhibition.

**DELHI STATE BRANCH**—A meeting was held on 5-8-59 when members condoled the sad and tragic death of Dr. Devi Chand Gupta, an active member of the association. The meeting also conveyed its condolence to the members of the bereaved family.

An extraordinary general meeting of the State Branch was held on 12th August 1959. The members expressed their strong protest against the enforcement of the Delhi Shops and Establishment Act in the following resolution :

"Whereas the Delhi Shops & Establishment Act enforced in Delhi in 1954 exempted doctor's clinics from one or two clauses and on representation by the D.M.A. the then Delhi State Cabinet after thorough and detailed consideration granted total exemption to the doctors' clinics and

Whereas now the Delhi Administration has reimposed the Act on the doctor's clinic without any change of circumstances and without any reference to the D.M.A. and

Whereas the medical profession in Delhi is perturbed over the action of the Government which will ultimately prove detrimental to the interest of the ailing public and the profession and would inhibit and limit the scope and time of medical aid being available at thousands of clinics of doctors which are essential "Miniature hospitals" and

Whereas the administration has accepted the principle of exempting essential services like the Air Lines, C.H.S., Fire-Services etc. and the hospitals and institution for the care of the infirm and sick where indoor treatment is given,

This extraordinary general meeting of the Delhi Medical Association lodges its strong protest against this indiscriminate, arbitrary, illadvised and unjust action of the Delhi Administration and demands an immediate withdrawal of this order and restore status quo in the larger interests of the health services of Delhi State area."

**DIBRUGARH BRANCH**—A meeting of the branch was held on 18-8-59. The members condoled the death of Dr. B. N. Banerjee, Principal, Assam Medical College. The meeting also conveyed its condolence to the members of the bereaved family.

**ERODE BRANCH**—A meeting of the branch was held on 28-7-59 with Dr. R. S. Vankatraman in the chair. Dr. (Miss) K. Menonmani of Government Hq. Hospital, Coimbatore, spoke on "Intra-Thoracic Tuberculosis in Children". Thirty-five doctors were present.

**GUMLA BRANCH**—A meeting of the branch was held on 15-8-59. Eight members were present. The members wanted (1) release of operational control by executives over medical personnel, (2) raising of pay of medical officers of State Medical Service to the grade of IAS, (3) taking up antiepidemic measures against typhoid by free mass inoculation with T.A.B. vaccine. Office-bearers of the branch were elected with Dr. B. N. Shukla as president, Dr. N. G. Das Gupta as vice-president, Dr. (Mrs.) S. K. Verma as treasurer, Dr. B. N. Lal as auditor and Dr. S. N. G. Roy as secretary.

**KARIMNAGAR BRANCH**—The monthly clinical meeting of the branch was held on 13-8-59, with Dr. Mohd. Gulam Nabi in the chair. The following cases were presented : (1) A case of Abdominal Colic on whom Laparotomy was done. The patient died a year back. She was considered a case of neurosis. (2) A case of Ascites Tubercular in which PP (Pneumoperitoneum) was given a trial. (3) A case of compound presentation i.e. head, two legs round the neck and cord round the neck, was delivered by version by Dr. M. B. Srinivasan. (4) A case of Peritonitis of 4 days' duration.

**MADHIPURA BRANCH**—A meeting of the branch was held on 18-8-59. Dr. S. Prasad presided. Nine members were present. The meeting condoled the death of Dr. B. N. Banerjee at Dibrugarh on 14-8-59.

**MADURA BRANCH**—The monthly meeting of the branch was held on 14-8-59 with Dr. K. Gopal in the chair. Dr. C. O. Karunakaran, President, I.M.A. spoke on "The IMA's Activities and Achievements." He requested the members to bring all the registered medical practitioners under the Association. He also referred to the improvement of Public Health, to which the members could contribute to a large extent. He requested the members to donate liberally to the Building Fund IMA Central Office, Delhi.

Dr. V. S. Meenakshy of Erskine Hospital delivered a lecture on Mediastinal Syndrome and demonstrated a few interesting cases. The meeting considered the additional insertion of a doctor's name in the classified list of Telephone Directory on extra payment as against medical ethics and requested the Director General, Post & Telegraphs to print the doctor's name in the general alphabetical order only. The meeting also requested the authorities of the Life Insurance Corporation to retain the existing Medical Licentiates as medical examiners of Life Insurance cases.

**MIRAJ BRANCH**—The monthly meeting of the branch was held on 14-7-59. As per request of the Assam State Branch it was decided to raise a fund immediately in aid of the flood victims of Assam. Dr. K. Banerjee and Dr. A. G. Fletcher reported a case of Abdominal Aorta successfully operated. Dr. A. G. Fletcher and Dr. S. K. Bose presented two cases of Dissection of the Oesophagus.

**MONGHYR BRANCH**—A meeting of the branch was held on 23-8-59. Dr. J. Prasad presided. Thirty-five members were present. After the routine business was over, the following lectures were delivered : (1) Emergency in Paediatric Practice by Dr. Lala S. Prasad of Patna Medical College, (2) Common Diseases in Infants and Children by Dr. S. Ram, (3) Heart Diseases by Dr. B. Prasad.

**NAGAPATINAM BRANCH**—An extraordinary meeting of the branch was held on 1-8-59. Dr. A. Thiyagarajan presided. Lt. Col. V. R. Thayumanaswami gave a lecture on Supracondylar Fractures in Children.

**RANCHI BRANCH**—The annual dinner of the branch was held on 16-8-59. Sri B. C. Patel, Minister of Health, was the chief guest. The members accorded a hearty welcome to Sri Patel and Dr. M. N. Sarkar, an eminent gynaecologist of Calcutta who was also a prominent guest.

**SALEM BRANCH**—The branch held monthly meetings in April, May, June and August. Dr. S. Sundaram presided over the meetings. In April, Dr. M. N. Mahadevan of Bangalore spoke on Pulmonary Heart Diseases. In May, Dr. C. R. Gopinath spoke on Problem and Management of Skin Diseases peculiar to women and children. In June, Dr. M. Viswanathan spoke on Diabetes and the Family Physician. In August Dr. J. K. G. Webb of Christian Medical College, Vellore, discussed the Diagnosis and Treatment of Meningitis in Children. A resolution of condolence was also passed on the death of Dr. B. A. Rajaratnam, a founder member and an ex-president of the branch.

**SHILLONG BRANCH**—A clinical meeting was held on 25-7-59. Thirty-two members were present. Dr. (Mrs.) Kocher spoke on "Effect of Hypotensive Drugs on Toxaemias of Pregnancy with case records", followed by a discussion by the members.

A meeting of the branch was held on 22-8-59 with Dr. S. Bhattacharyya in the chair. Thirty-six members were present. The members condoled the sad demise of Rajyapal Shri Saiyid Fazl Ali, Governor of Assam and Dr. B. N. Banerji. Dr. Thakar, Ex-President, Indian Medical Association, addressed the meeting and congratulated the branch on the strength of its membership and explained the basic principles and working of the Employees' State Insurance Scheme. A film on "Broncho-Pulmonary Segments" was shown to the members.

**SHOLAPUR BRANCH**—The medical profession of Sholapur strongly felt that there should be a medical college at Sholapur in the near future. An Ad-hoc committee is pursuing the matter in right earnest. Regarding a building for the branch, progress is noticeable. Dr. V. G. Vaishampayan gave a talk to the members regarding his tour in Japan and Hongkong where he had gone to study the working of medical colleges. World Health Day was celebrated on 7-4-59. Members spoke on Mental Illness and Mental Health in the World today. The membership of the branch has considerably increased. A well attended meeting was held at the Railway Hospital.

**TIRUCHY BRANCH**—A monthly meeting of the branch was held on 25-7-59. Dr. R. Sambasivan presided. Fifty-six members were present. Lady Rama Rao and Mrs. Wadia gave short speeches on Family Planning. The members attended to a number of circulars. Regarding Madras Clinical Journal, it was not possible to run the Journal by the branch. It was decided to conduct the Journal under the auspices of the Tiruchy District Medical Association. The closure of all medical shops on Sundays caused inconvenience to the public and the District Medical Officer, Tiruchy, was requested to arrange the closure of shops on different days of the week. Dr. Jacob Chandy of Christian Medical College gave a talk of Pott's Paraplegia. Films on A Vitamin Emerges and Defence against Polio were shown to the members.

**TIRUNELVELI DISTRICT BRANCH**—The monthly meeting of the branch was held on 25-4-59. Thirty members were present. Dr. D. I. Abraham presided. Circulars were read and recorded. Dr. (Mrs.) Kamakshi Kabir read a paper on Rupture Uterus. Her talk was based on her personal experiences of 19 cases of rupture uterus treated at the Women and Children Hospital, Vannarpet, in course of the year.

The monthly meeting was held on 30-5-59. Thirty-two members were present. Dr. D. I. Abraham presided. Dr. K. N. Vasudevan of Erskine Hospital gave a talk of Chronic Cholecystitis, and displayed skiagrams taken of his patients at Madurai. This was followed by discussions amongst the members.

The monthly meeting was held on 27-6-59. Twenty-three members were present. The election of the Presiwent and vice-presidents of Madras State Branch was done. Dr. K. Rajagopalan delivered a lecture on the Common Diseases of Nose and Throat, which was followed by a discussion by the members.

**UDIPI BRANCH**—A clinical meeting of the branch was held on 12-8-59 at the Rotary Hall, Manipal. Dr. S. R. Pai presided. Dr. K. P. Ganeshan spoke on Sex and its Anomalies. The members bade a Bon Voyage to Dr. T. M. A. Pai who was to go on tour abroad, sponsored by IMA.

**VISAKHAPATNAM BRANCH**—The monthly general meeting of the branch was held at the clinical lecture hall, K. G. Hospital. Dr. D. Govindarajul, D.M.O., presided. The names of the 5 members going abroad on Study Tour were mentioned and the members wished them Bon Voyage. Election of the president and vice-president of I.M.A. (Central) took place.

## ANDHRA PRADESH MEDICAL JOURNAL.

*The Andhra Pradesh Branch of the Indian Medical Association is shortly publishing a journal to be called the Andhra Pradesh Medical Journal which will be supplied to all members within the State of Andhra Pradesh. Further inquiries may be addressed to the Editor of the A. P. Medical Journal, I.M.A. Building, Sultan Bazar, Hyderabad.*

## XXVI MYSORE STATE MEDICAL CONFERENCE, BANGALORE, 1959

*The 26th Mysore State Medical Conference is scheduled to be held in Bangalore from 3rd to 5th October 1959. This is the first time that the Annual State Medical Conference will hold session after the Re-organisation of States.*

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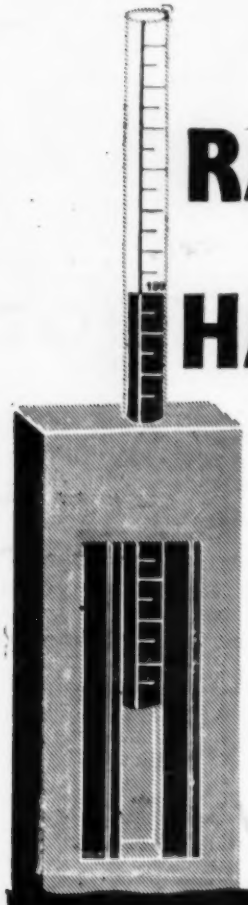

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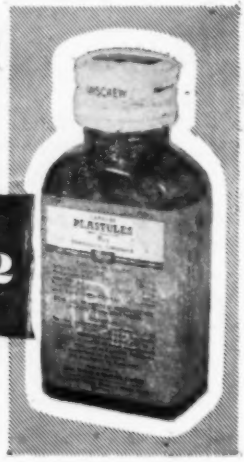


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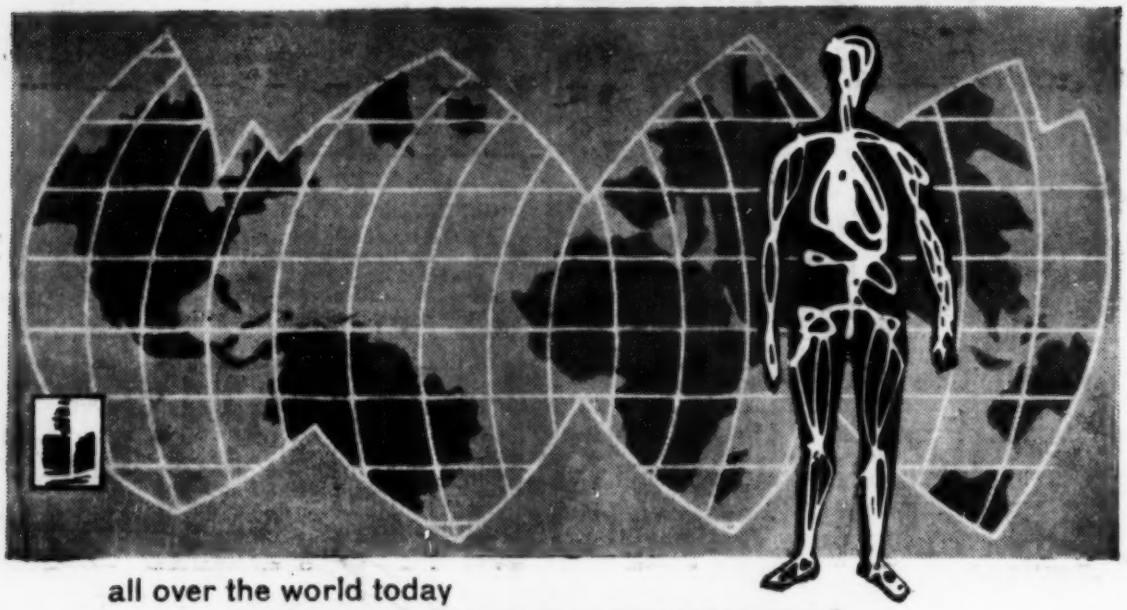

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